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ABSTRACT

Individually Guided Education (IGE) is a complex educational system intended to enable the elementary school to provide an environment where students learn at a rate and in a manner appropriate to their own learning styles. This descriptive study concerns the implementation of the Wisconsin Design for Reading Skill Development (WDRSD), an instructive management system which was created to be compatible with the IGE system. The WDRSD is an objective-based system that provides both structure and substance for an elementary school reading program. The focus is on developing the essential subskills of reading, which once acquired and applied enable students to read successfully. The WDRSD has four fundamental purposes: (1) to identify and describe instructional objectives for the skills which appear essential for competence in reading; (2) to assess individual pupils' skill development status; (3) to manage instruction of children with different skill development needs; and (4) to monitor each pupil's progress. Grades 2 and 5 participated at each school, and data were collected through tests on general objectives of the program, observations, teacher logs, and interviews. Profiles by school for each grade on means of instruction (pacing, grouping, materials, and interactions), time use (allocated, nonapplied, available, and engaged time), and achievement provide a basis for discussing the relationships among variables. (Au[illegible]J)

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Technical Report No. 559

IGE Evaluation Phase IV: WDRSD Descriptive Study Final Report

by Anne G. Nerenz, Norman L. Webb,
Thomas A. Romberg, and
Deborah M. Stewart

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Wisconsin Research and Development
Center for Individualized Schooling

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Report from the Project on
Evaluation of Practices in Individualized Schooling

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- conducting and synthesizing research to clarify the processes of school-age children's learning and development
- conducting and synthesizing research to clarify effective approaches to teaching students basic skills and concepts
- developing and demonstrating improved instructional strategies, processes, and materials for students, teachers, and school administrators
- providing assistance to educators which helps transfer the outcomes of research and development to improved practice in local schools and teacher education institutions

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Abstract

This report is part of Phase IV of the IGE Evaluation carried out by the Wisconsin Research and Development Center for Individualized Schooling. IGE (Individually Guided Education) is a complex educational system intended to enable the elementary school to provide an environment where students learn at a rate and in a manner appropriate to their own learning styles. Phase IV included five studies, three descriptive and two comparative. This descriptive study concerns the implementation of the Wisconsin Design for Reading Skill Development (WDRSD), an instructive management system which was created at the R & D Center to be compatible with the IGE system. Grades 2 and 5 participated at each school, and data were collected through tests on general objectives of the program, observations, teacher logs, and interviews. Profiles by school for each grade on means of instruction (pacing, grouping, materials, and interactions), time use (allocated, nonapplied, available, and engaged time), and achievement provide a basis for discussing the relationships among variables.

I

INTRODUCTION

IGE and the Evaluation Project

Through the combined efforts of the Wisconsin Research and Development Center for Individualized Schooling, the University of Wisconsin IGE Teacher Education Project, the Kettering Foundation (I/D/E/A), and IGE coordinators in 25 states, more than 2,000 elementary schools have adopted a system called Individually Guided Education (IGE). This is a complex system based on theoretic and pragmatic ideas about schooling, children's learning, and the professional roles of school staffs. It was intended to influence elementary schooling in three general areas, organization, instruction, and intra- and inter-organizational relations, to provide

> an environment in which the individual students learn at rates appropriate to each student and in a manner suitable to each student's learning style and other intellectual and personal characteristics. (Klausmeier Rossmiller, & Saily, 1977, p. 7)

More specifically, as an operating system IGE functions on the basis of seven components:

1. Multiunit organization

   Instruction and Research (I & R) unit at the instructional level
   Instructional Improvement Committee (IIC) consisting of the principal and unit leaders at the school level
   System-wide Program Committee (SPC) at the district level

2. Instructional programming for the individual student (IPM)

   Stating educational objectives
   Estimating the range of objectives attainable by subgroups of the student population

Assessing the level of achievement, learning style and motivation
Setting instructional objectives for each child to attain over a short period of time
Planning and carrying out instruction for individual students
Assessing the attainment of objectives
Recycling through these procedures

3. Evaluation for educational decision making

Procedures to provide information about the student curriculum and overall school program at the beginning of a unit of instruction, during the instructional sequence, and at the end of a unit of instruction

4. IPM compatible curricular materials

Accurate and reliable content
Statements of instructional objectives
Suggested instructional activities appropriate to varied learning styles, reading levels, and other characteristics of individual students
Record keeping devices and procedures
Suitable in terms of cost

5. Home-school-community relations

6. Facilitative environments

Intraorganizational environment providing physical and material resources
Extraorganizational environment including state education agencies, intermediate educational agencies, and teacher education institutions

7. Continuing research and development

Thus, IGE has as its goals the instruction of students based on their individual level of achievement and learning styles, the development of particular types of organizational relationships within and outside of the school, and continuing research and evaluation.

Although much has been written about IGE as an alternative form of elementary schooling, no comprehensive picture exists showing the manner in which IGE has been implemented in these schools. Thus, in order to gain a more detailed view of the day-to-day operation and effectiveness of the system as a whole, the IGE Evaluation Project identifies features which contribute most to the success of reading skills and mathematics instruction as a result of individualized instruction (Romberg, 1976).

The evaluation project, comprised of five phases, was organized to provide complementary information on IGE. Phase I was a large sample study which provided basic information about IGE schooling. Certain features of IGE schooling were reputedly crucial to IGE success. The purpose of Phase I, then, was to examine the extent to which those presumably essential features had been implemented among IGE schools and to assess the effectiveness of that implementation. In this large sample study, including over 150 IGE schools, information was gathered from IGE school staff members using self-report surveys and from students using standard paper and pencil instruments. The data provided a functional understanding of IGE features, processes, and outcomes by relating a broad range of variables in an interpretive manner.

Phase II verified and extended the self-report data gathered in Phase I to include more fully the range of variables that determine the process of schooling.

Phase III investigated the social meaning which emerges as IGE is used on a day-to-day basis. The problem of understanding the impact of educational reform can be approached by viewing schools as social institutions whose characteristics shape and are shaped by the behaviors of their members. This focus allows us to think of a school as a complex social arrangement whose underlying patterns of conduct channel thought and action within that setting.

Since the success of IGE depends heavily on the availability of materials and evaluative procedures compatible with instructional programming for the individual student, an analysis of curriculum products designed to be used in IGE settings was undertaken. This aspect of the project--Phase IV--seeks to determine how well the three curricular programs developed for IGE meet their objectives, and to clarify the relationship of pupil outcomes to instructional time and means of instruction. In addition, Phase IV provides information about pupil activities and learning outcomes as they relate to specific objectives.

Finally, the goal of Phase V is to synthesize the results of Phases I through IV and to address the significant issues in contemporary schooling raised by the project as a whole. Each phase of the evaluation was designed to complement and strengthen the validity of the data gathered by the previous phases. For example, data on means of instruction, gathered by the large-sample study in Phase I, are examined in somewhat greater depth in fewer schools in the Phase II studies. Phase III's analysis develops a view of instruction from a different perspective. Phase IV explores means of instruction within the specific curricular areas of reading and mathematics. Instead of merely adding together summaries of the different evaluation phases, Phase V is designed to integrate and interpret the data from all the phases into a series of statements of the project's implications for educational issues.

Overview of Phase IV

The intent of Phase IV was to describe in detail the actual operations of a sample of schools using curriculum materials designed to be compatible with IGE. Phase IV investigated three groups of variables--pupil outcomes, instructional time, and means of instruction--in IGE and non-IGE settings in which the Center's curriculum program as well as alternative curriculum materials were being used. Pupil attainment of program objectives is the dependent variable. The other two variables, instructional time and means of instruction, are essential in explaining and understanding how the programs work and how objectives are obtained. Instructional time was included because recent studies and reviews stress its importance and its relationship to pupil outcomes (Harnischfeger & Wiley, 1975; McDonald & Elias, 1976; Rosenshine, 1977). As Harnischfeger and Wiley state, "All influences on pupil achievement must be mediated through a pupil's active and passive pursuits" (p. 15). Instructional time and uses of instruction variables are also important from a practical point of view because they can be manipulated by teachers: Describing the use of each program in terms of allocated time, engaged time, and instructional activities provides concrete factors that teachers can manipulate in preparing and conducting instructional activities. The structural relationships among these variables are illustrated in Figure 1.

In sum, the primary purposes of Phase IV are:

1. to determine the degree to which the Wisconsin Design for Reading Skill Development (WDRSD) (Otto, 1977), the Pre-Reading Skills program (PRS) (Venezky & Pittelman, 1977), and Developing Mathematical Processes (DMP) (Romberg, 1977), meet their objectives and skills.

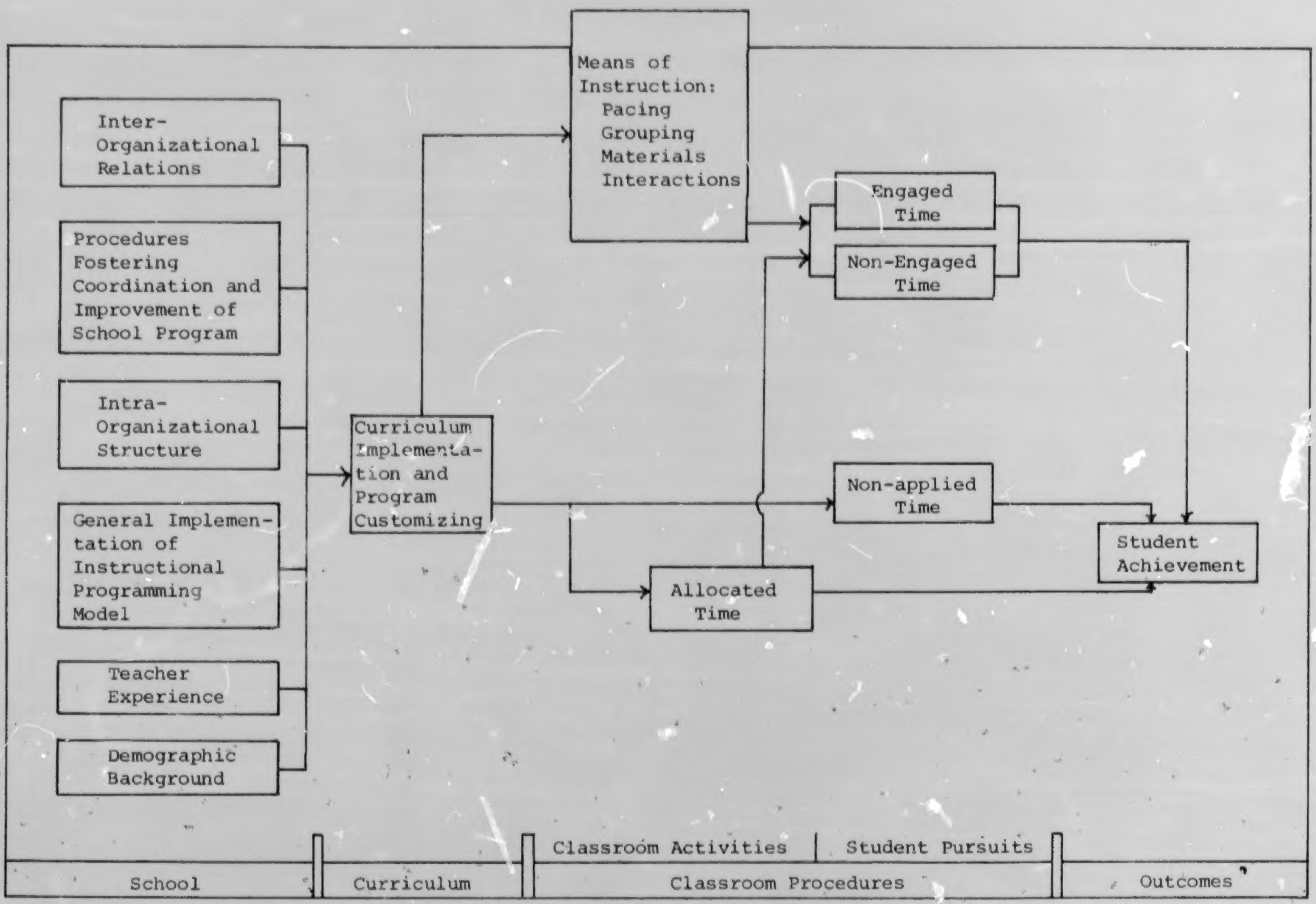
Means of Instruction:
Pacing
Grouping
Materials
Interactions
Inter-Organizational Relations
Procedures Fostering Coordination and Improvement of School Program
Intra-Organizational Structure
General Implementation of Instructional Programming Model
Teacher Experience
Demographic Background
Curriculum Implementation and Program Customizing
Engaged Time
Non-Engaged Time
Non-applied Time
Allocated Time
Student Achievement
Classroom Activities
Student Pursuits
School
Curriculum
Classroom Procedures
Outcomes

Figure 1. Phase IV model of anticipated relationships between variables.

2. to determine how time is allocated for instruction in implementing WDRSD, PRS, and DMP.

3. to relate instructional time to the means of instruction and mastery of content for WDRSD, PRS, and DMP.

4. for each curriculum program, WDRSD and DMP, to contrast two situations--IGE schools using the program with non-IGE schools using the program and IGE schools using the program with IGE schools using alternative programs--on the variables of pupil outcomes, instructional time, and means of instruction.

Five studies were conducted as part of Phase IV, three descriptive studies and two comparative studies. The descriptive studies were small sample studies designed to describe how each of the three curriculum programs were being used in IGE schools. Each study was conducted from January to May 1978 at two IGE schools using DMP, two IGE schools using WDRSD, and three IGE schools using PRS. A more detailed description of the two WDRSD schools is provided in the following section of this paper. Achievement monitoring and domain referenced tests, observations, teacher logs, and interviews were used to collect the data. These procedures were piloted for subsequent use in the comparative study. A more detailed description of the design for the descriptive studies is given in Project Paper 79-42 (Webb & Romberg, 1979).

Data were gathered for the two comparative studies from October until May during the 1978-1979 school year. Three types of schools were included in these studies: (a) IGE schools using DMP or WDRSD; (b) non-IGE schools using DMP or WDRSD; and (c) IGE schools using alternative programs. Four triads of schools were selected for WDRSD and three triads for DMP with each triad containing one school from each of the three cells just mentioned. Only students in grades 2 and 5 and their teachers participated in the study. As in the descriptive studies, data were collected by four means: tests on general objectives of each program, observations, teacher logs, and interviews.

Overview of Remaining Sections

This report deals with the WDRSD descriptive study. Following an outline of the WDRSD curriculum program and a summary of the data collection procedures, a description of the two schools which participated in the study is provided. Grade 2 and grade 5 profiles by school for the means of instruction (pacing, grouping, materials, interactions), time (allocated, nonapplied, available, engaged), and achievement variables are considered in subsequent sections. The report concludes with a discussion of the relationships among the time and achievement variables.

II

PROCEDURES

This section provides an overview of the procedures used in the descriptive studies. The description of the WDRSD highlights important features of the curriculum program which distinguish it from other self-contained or record-keeping systems. Because data on the content of instruction were obtained from several sources and then combined for analysis, a list of the reading skills at each level of aggregation is included, followed by a description of the data collection procedures themselves.

The WDRSD Program

In order to better understand the observation, log, and testing procedures, a brief introduction to the *Wisconsin Design for Reading Skill Development* (WDRSD) may be helpful. The WDRSD is an objective-based system that provides both structure and substance for an elementary school reading program. The focus is on developing the essential subskills of reading, which once acquired and applied enable students to read successfully. The WDRSD has four fundamental purposes:

1. to identify and describe instructional objectives for the skills which appear essential for competence in reading.
2. to assess individual pupils' skill development status.
3. to manage instruction of children with different skill development needs.
4. to monitor each pupil's progress (Otto & Askov, 1973).

The WDRSD provides a framework for teaching reading skills as the basis of a curriculum in which individual differences in students' rate and style of learning are emphasized. This organization of instruction includes five major operations:

1. identification of a list of essential reading skills, with consensual, historical, and/or empirical support;
2. statement of objectives specifying the criterion behaviors related to each skill;
3. assessment of children to determine who has or has not already mastered each skill;
4. identification of appropriate materials and activities for instruction in each skill; and finally,
5. evaluation of learning.

Based on these operations, the following material components for the WDRSD curriculum program were developed:

1. descriptions of the skills which appear essential for competence in reading;
2. assessment instruments for determining students' skill strengths and weaknesses;
3. management guidelines for skill instruction, grouping, testing, and monitoring;
4. sample instructional activities to develop the skills; and
5. evaluation guidelines.

In the skills and objectives component, six areas of skills have been identified: Word Attack, Study Skills, Comprehension, Self-directed Reading, Interpretive Reading, and Creative Reading. Behavioral objectives were written for each skill in the first three of these six areas. Assessment exercises and teachers' resource files accompany each of these objectives. The skills in the other three areas are not behaviorally described and assessment exercises are not included. Skills in each of the six elements are clustered at levels that correspond to traditional grade levels, as shown in Table 1, in order to facilitate initial

Table 1

WDRSD Skills by Element and by Traditional Grade Level

Skill area	Grade						
	K	1	2	3	4	5	6
Word attack	A	B	C	D	-	-	-
Comprehension	A	B	C	D	E	F	G
Study skills	A	B	C	D	E	F	G
Self-directed reading	A-C			D-E		F-G	
Interpretive reading	A-C			D-E		F-G	
Creative reading	A-C			D-E		F-G	

implementation and to help in general skills assessment and regrouping.

Formal tests of demonstrated reliability which are suitable for individual or group administration and which aid in the preparation of skill development profiles have been developed for most of the skills in Word Attack, Comprehension, and Study Skills. There are two available forms, Form P and Form Q. The forms are parallel and may be used interchangeably.

Each test is keyed to a specific objective, and tests are available in two formats: separately for a single skill, or in booklets which include all the skills at a given level. The tests are criterion referenced and generally machine-scorable. Certain skills which could not adequately be assessed with paper and pencil tests are assessed with individually administered performance tests.

Content Aggregations

In the descriptive study of Phase IV, information on the content taught during WDRSD reading skills instruction was obtained from the teacher logs, classroom observations, and achievement monitoring tests. These data were grouped for analysis at three progressively more specific levels. The most inclusive is the "content area," followed by the "general objective" and the "specific objective."

As outline in the WDRSD (Otto, 1977), reading skills may be organized into three content areas: Word Attack, Comprehension, and Study Skills. Within each of these content areas, from one to six general objectives and the specific objectives which they represent are described below. The grade 2 Word Attack, Comprehension, and Study Skills aggregations are shown in Figures 2, 3, and 4, and grade 5 aggregations are outlined in Figures 5, 6, and 7. A more detailed explanation of the WDRSD skill levels and objectives which were included in each aggregation is provided in Project Paper 80-1 (Nerenz & Webb, 1980).

Data Collection

Tests. Two types of tests were used to measure pupil outcomes for this descriptive study. Information on achievement was obtained at three different times using achievement monitoring procedures. This procedure provides a means of assessing achievement on a large number of skills at several points in time and yields more information on the growth of groups of students than would be obtained by a simple pretest-posttest design. Generally, test items from WDRSD skills tests Forms P and Q were selected and assigned to test forms using matrix sampling techniques such that the set of two to four items testing the different WDRSD skills were divided among four test forms. During each testing, one-fourth of the pupils were given each form so that each pupil was tested on only a portion of the entire set of reading skills at a time. In this manner, data were obtained for the group on a large number of skills with minimal disruption of normal classroom activities.

The second testing procedure, domain referenced testing, was used to obtain information on all students for a small number of reading skills. Three objectives at each grade level were tested. Using an operational definition of the reading skill specifying exactly what content composed the domain, items were selected or created and assigned to a test form. The same form was administered to all pupils. Details

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
01	Phonic Analysis--Consonants	01	Beginning and Ending Consonant Sounds	201 B 3	Beginning consonant sounds
				202 B 4	Ending consonant sounds
		02	Consonant Blends	203 B 5	Two-letter consonant blends
				208 C 3	More difficult two-letter consonant blends
				224 D 2	Three-letter Consonant blends
		03	Special Consonant Sounds	207 C 2	Consonants and their variant sounds
				217 C12	Common consonant digraphs
02	Phonic Analysis--Vowels	04	Long Vowels	209 C 4	Long vowel sounds
				214 C 9	Silent e generalization
				215 C10	Two vowels together generalization
				216 C11	Final vowel generalization
		05	Short Vowels	213 C 8	Short vowel generalization (middle vowel)
		06	Special Vowel Sounds	210 C 5	Vowel plus r, a plus l, a plus w
				211 C 6	Diphthongs ew, oi, ou, ow
				212 C 7	Long and short oo
				311 D 6	Schwa
03	Phonic Analysis--Silent Letters	07	Silent Letters	225 D 3	Silent letters
04	Structural Analysis	08	Possessives	317/205 B13	Possessive forms
				227 D 7	More difficult possessive forms
		09	Rhymes	204 B 6	Rhyming elements
		10	Word Structure	339 B 9	Compound words
				346 B11	Base words and endings
				218 C13	Base words with prefixes and suffixes
		11	Plurals	219 C14	More difficult plural forms
		12	Contractions	316 B10	Contractions
		13	Word Analysis	226 D 4	Syllabication
				320 D 5	Accent
05	Vocabulary Meaning	14	Special Meanings	220 C15	Homonyms
				221 C16	Synonyms and antonyms
				223 C18	Chooses appropriate meaning of multiple-meaning words
		15	General Word Attack Skills	206 C 1	Has sight word vocabulary
				222 C17	Has independent and varied word attack skills

Figure 2. Grade 2 WDRSD word attack content aggregations.

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
06	Passage Meaning Skills	16	Central Thought	330 B 2	Identifies a topic: With organizer
				241 C 3	Identifies a topic: Without organizer
				304 E 5	Identifies central thought: With organizer
		17	Reasoning	336 B 3	Predicts outcomes
				302/242 C 4	Identifies conclusions: One relationship
				327 D 5	Identifies cause-effect relationships
				318 E 6	Identifies conclusions: Direct relationships
		18	Sequence	332 B 4	Identifies event: Before
				332 B 5	Identifies event: After
				243 C 5	Determines sequence: Event before of after
				308/309 F 6	Determines sequence: Implicit clues
				308 G 8	Determines sequence: Implied and stated events
07	Sentence Meaning Skills	19	Detail	334 B 1	Derives meaning from sentences: Notes detail
				303/239 C 1	Notes detail in positive and negative sentences
				331 D 2	Notes detail in active and passive voice sentences
		20	Paraphrase	340/240 C 2	Paraphrases positive and negative sentences
				341 D 3	Paraphrases active and passive voice sentences
08	Word Meaning Skills	21	Word Parts	337 F 1	Identifies word parts: Suffixes
		22	Context Clues	305/321 D 1	Determines word meaning: Identifies direct context clues
09	General Reading	23	General Reading	244	Creative reading
				245	Interpretive reading
				246	Self-directed reading
				247	Silent reading
				301	General comprehension
				306	Oral reading
				307	Enrichment
				343	Basal reader
				344	Language arts

Figure 3. Grade 2 WDRSD comprehension content aggregations.

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
10	Map Skills	24	Representation	338 B 1	Uses picture symbols to interpret maps
				228 C 1	Uses a key containing nonpictorial symbols to interpret maps
				229 C 2	Uses a color key to interpret maps
		25	Orientation	230 C 3	Locates points on simple picture grids
				326 D 2	Indicates cardinal directions on globes
		26	Measurement	333 B 3	Determines relative distances
				231 C 4	Compares sizes
				232 C 5	Expresses relative distances
11	Graph and Table Skills	27	Graphs	233 C 6	Extracts directly
				234 C 7	Determines differences between numbers extracted
		28	Tables	235 C 8	Compares amounts
				236 C 9	Locates cells
12	Reference Skills	29	Alphabetizing	238 C11	Applies basic alphabetizing skills
				321 D10	Applies alphabetizing skills
				345 D11	Uses guide words in simple reference books
				322 E12	Uses guide words and guide letters
		30	Dictionary Skills	323 D 8	Has beginning dictionary and glossary skills
				335 E 9	Uses dictionaries independently
		31	Locating Information in Books	237 C10	Develops book skills
				325 D 9	Uses tables of contents
				328 D12	Uses headings and sub-headings

Figure 4. Grade 2 WDRSD study skills content aggregations.

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
01	Phonic Analysis--Consonants	01	Consonant Blends	403 C 3	Two-letter consonant blends
				251 D 2	Three-letter consonant blends
		02	Special Consonant Sounds	402 C 2	Consonants and their variant sounds
				412 C12	Common consonant digraphs
02	Phonic Analysis--Vowels	03	Long Vowels	404 C 4	Long vowel sounds
				409 C 9	Silent e generalization
				410 C10	Two vowels together generalization
				411 C11	Final vowel generalization
		04	Short Vowels	408 C 8	Short vowel generalization (middle vowel)
		05	Special Vowel Sounds	405 C 5	Vowel plus r, a plus l, a plus w
				406 C 6	Diphthongs ew, oi, ou, ow
				407 C 7	Long and short oo
				422 D 6	Schwa
03	Phonic Analysis--Silent Letters	06	Silent Letters	252 D 3	Silent letters
04	Structural Analysis	07	Possessives	253 D 7	Possessive forms
		08	Word Structure	413 C13	Base words with prefixes and suffixes
		09	Plurals	414 C14	More difficult plural forms
		10	Word Analysis	476/420 D 4	Syllabication
				421 D 5	Accent
05	Vocabulary Meaning	11	Special Meanings	415 C15	Homonyms
				416 C16	Synonyms and antonyms
				418 C18	Chooses appropriate meaning of multiple-meaning words
		12	General Word Attack Skills	401 C 1	Has sight word vocabulary
				417 C17	Has independent and varied word attack skills
				419 D 1	Has sight word vocabulary
				287	Vocabulary

Figure 5. Grade 5 WDRSD word attack content aggregations.

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
06	Passage Meaning Skills	13	Central Thought	450 E 5	Identifies central thought: With organizer
				279 F 4	Identifies central thought: Without organizer
				444 DC D1	Identifies a topic sentence
				456 DC F1	Identifies a main idea: Two paragraphs
		14	Reasoning	446 C 4	Identifies conclusions: One relationship
				452/465/469 E 6	Identifies conclusions: Direct relationship
				280 F 5	Identifies conclusions: Indirect relationships
				460 DC F3	Reasons deductively: Three premises
				461 DC F4	Recognizes an instance of a principle
				466 DC G3	Reasons inductively
		15	Sequence	464/470 E 7	Determines sequence: Explicit clues
				445/451/281 F 6	Determines sequence: Implicit clues
				457 G 8	Determines sequence: Implied and stated events
07	Sentence Meaning Skills	16	Detail	447 E 3	Notes detail in sentences with more than one subordinate clause
		17	Paraphrase	448 D 3	Paraphrases active and passive voice sentences
				453 E 4	Paraphrases complex sentences
				462/278 F 3	Paraphrases complex sentences with two or more prepositional phrases
08	Word Meaning Skills	18	Word Parts	455 E 1	Identifies word parts: Prefixes
				463/276 F 1	Identifies word parts: Suffixes
				471 G 1	Identifies word parts: Combining forms
		19	Context Clues	449 D 1	Determines word meaning: Identifies direct context clues
				454/277 F 2	Identifies indirect context clues: Application
				468 G 3	Identifies context clues: Obscure meanings
09	General Reading	20	General Reading	282	Creative reading
				283	Interpretive reading
				284	Self-directed reading
				285	Silent reading
				286	General comprehension
				288	Enrichment

Figure 6. Grade 5 WDRSD comprehension content aggregations.

General Objective		Specific Objective			
Case Number	Descriptor	Case Number	Descriptor	Case-Skill	Descriptor
10	Map Skills	21	Representation	254 D 1	Uses point and line symbols to interpret
				256 E 1	Uses point, line, and area symbols
				264 F 1	Analyzes maps of two or more areas to determine similarities and differences
		22	Orientation	423 D 2	Indicates cardinal directions on globes
				257 E 2	Determines intermediate directions on globes in the environment, and on maps
				265 F 2	Uses various projections
		23	Measurement	424 D 3	Uses scale to determine whole units of distance
				258 E 3	Makes limited use of scale to determine distances
				266 F 3	Uses inset maps to determine relative sizes of areas
				267 F 4	Compares maps drawn to different scales
11	Graph and Table Skills	24	Graphs	425 D 4	Determines differences between numbers extracted
				255 D 5	Extracts by interpolating
				435 E 4	Determines differences between numbers extracted
				259 E 5	Determines purposes and makes summary statements
				268 F 5	Determines differences between numbers extracted
		25	Tables	426 D 6	Determines relationships between cells
				436 E 6	Determines relationships between cells
				437 E 7	Determines purposes and makes summary statements
				269 F 6	Determines relationships between cells on schedules
12	Reference Skills	26	Alphabetizing	430 D10	Applies basic alphabetizing skills
				431 D11	Uses guide words in simple reference books
				440 E12	Uses guide words and guide letters
		27	Dictionary Skills	428 D 8	Has beginning dictionary and glossary skills
				261 E 9	Uses dictionaries independently
				271 F 8	Uses dictionaries for pronunciation
		28	Locating Information in Books	427 D 7	Begins to use indexes
				429 D 9	Uses tables of contents
				432 D12	Uses headings and sub-headings
				260 E 8	Refines use of indexes
				438 E10	Uses cross references
				439 E11	Uses a variety of sources
				270 F 7	Uses Subject Index
				275 F12	Uses information on catalog cards to select material
		29	Locating Specialized Information	262 E13	Uses guide cards
				442 E15	Selects specialized reference books
				272 F 9	Applies card filing rules
				273 F10	Uses Dewey Decimal System
		30	Recording	441 E14	Takes notes
				274 F11	Has beginning outlining skills
		31	Evaluation	433 D13	Selects relevant sources
				434 D14	Recognizes printed statements may be fact or opinion
				443/263 E16	Considers special features of books

Figure 7. Grade 5 WDRSD study skills content aggregations.

on both testing procedures are provided in Project Paper 79-29 (Dunham, Nerenz, & Webb, 1979).

Observations. The Phase IV observation system was modeled after the one used in the Beginning Teacher Evaluation Study (Marliave, Fisher, Filby, & Dishaw, 1977) and was designed to describe how WDRSD was being used. In particular, the observation system used time as a metric to describe how the curriculum program operates to facilitate student achievement of the objectives of the program. The categories used in the observation system were:

Nonapplied Time - - - - time devoted to other than the curricular program being observed

Specific Content- - - - reading skill

Pace- - - - - - - - - - - whether or not the student is working at his or her own pace

Grouping- - - - - - - - - size of group of which the student is a member

Materials - - - - - - - - the materials being used by the student

Learner Moves - - - - - - student engagement or nonengagement

Interaction - - - - - - - persons with whom the student is interacting and the direction and focus of that interaction

This procedure involves the observation of a single "moment" within a longer period of time and the recording of the "event" that tock place during the instant. Briefly, a sample of six randomly selected target students was observed in a cycle of approximately three and a half minutes. For the first target student, the observer took a "snap shot" of what the target student was doing at the beginning of the cycle. The student activity at the instant of observation was recorded on the form by filling in the appropriate categories. Then the next target student was observed for a moment and his or her activity coded. The procedure continued until all six target students had been observed, which took approximately 3 minutes. Thirty seconds were then taken to record the major role of the teacher(s) and general activities occurring in the classroom. This cycle was repeated, observing each target student in sequence and recording general comments, during the time allocated for work on the curriculum program. A more detailed description of the observation procedures is provided in Project Paper 79-32 (Webb, 1979a).

Logs. For the WDRSD descriptive study, logs were maintained for a sample of six target students at each grade level in order to obtain a measure of the total time allocated to instruction on specific objectives during the investigative period. These logs were completed by the teachers who were directly responsible for instruction. On the logs, the amount of time allocated to instruction on each reading skill, the size of the group with which the target student was working during instruction, and the type of materials being used were recorded. A more detailed description of the logs and logging procedures is provided in Project Paper 79-31 (Webb, 1979b).

Interviews. Interviews were conducted with at least one teacher at grades 2 and 5 to obtain information on a small number of background, organizational, curriculum, and instructional variables. Transcripts and summaries of these data are available in Project Paper 79-30 (Nerenz, 1979h).

III

DESCRIPTION OF THE SCHOOLS

The WDRSD descriptive study of Phase IV was designed to provide detailed information about instruction in reading skills at grades 2 and 5 for two schools. Both schools began using the WDRSD in 1971 and implemented portions of the program at each grade level. They were selected to participate because of their differences in demographic setting and operational features as well as their utilization of the curriculum program itself. In this section of the report, background, organizational program use, and initial achievement variables are compared for each of the two schools.

Demographic Background

School 452 is one of seven elementary IGE schools using the WDRSD in a middle-class midwestern community of approximately 6,000 people. This community would be classified as a "small place" using the categories of size and type of community suggested by the National Assessment of Educational Progress (NAEP); the principal occupations included farming or small businesses and industries. The staff of 38 teachers, aides, and specialists worked with a total of 519 students in three multiage/grade units during the 1977-78 school year.

In contrast, school 504 is one of three public elementary schools located in a suburb of Minneapolis classified by NAEP as "urban fringe." In the district, it is the only IGE school as well as the only elementary school to implement the WDRSD. The community includes both professional people who commute to Minneapolis and farmers who have lived in or near the town for many years, so that the observer described the town as having a "rural influence and background as well as a metropolitan attitude." The 500 students at school 504 were involved with 39 staff members and were organized into four multiage, cross-graded units.

IGE Characteristics

Information on the schools' implementation of portions of the seven basic components of an IGE system was obtained using four variables developed from the Phase I self-report questionnaires. These variables are defined below.

The first variable, Interorganizational Relations (IOR), measures the school's interrelationships and activities with persons and organizations outside of the school, especially those believed to facilitate implementing and maintaining IGE. IOR deals with the role and frequency of meetings of the School Program Committee (SPC), school involvement in a network of IGE schools, and community relations.

Intraorganizational Structure (IOS) measures aspects of the school's internal organization which are relevant to implementing IGE. Organizational structures within the school (Instructional Improvement Committee, Instruction and Research Units, etc.) are assessed for characteristics such as membership composition, frequency of meetings, permanence of leadership, amount of release time made available for meetings, whether parents and others participate in the group's activities, whether agenda of meetings are kept, and how agenda are distributed. The existence and responsibilities of certain supplementary staff positions (IMC directors, student teachers, aides, and interns) are also assessed as part of the internal organization of the school.

The third variable, Procedures Fostering Coordination and Improvement of the School Program (GOS), is a measure that includes research and development, staff development, use of volunteers and aides, noninstructional (advisory) contact between teachers and students, and other aspects of home-school-community relations.

General Implementation of the Instructional Programming Model is a measure of implementation of general school practices that have been encouraged by the Wisconsin R&D Center as supportive of the Instructional Programming Model (IPM). It is developed from the seven steps in the IPM: (a) setting school-wide instructional objectives; (b) adapting school-wide objectives in each unit; (c) preassessment; (d) setting objectives for the individual child; (e) instruction; (f) evaluation of instruction; and (g) overall program assessment.

The mean for the Phase I sample of 156 schools, scores for schools 452 and 504, and the percentile of these scores in the Phase I sample are shown in Table 2. As Table 2 indicates, school 452 ranked high in "IGE-ness," being in the 90th percentile for 2 of the 4 scales under consideration. Scores at school 504 were generally close to the mean for the 156 Phase I schools.

Program Use

Program use scales were developed to measure, first, the degree of implementation of the different material and management components of the WDRSD and, second, the extent to which these materials were

Table 2

Mean, Score, and Percentile for
Four Phase I Questionnaire Variables
for Schools 452 and 504

	156 Phase I schools	School 452		School 504	
Variable	Mean	Score	Percentile	Score	Percentile
IOR	17	27	94	13	30
IOS	20	25	97	24	79
GOS	57	62	66	57	52
IPM	62	73	83	63	46

customized in order to meet individual children's needs. These scales are described in detail in Project Paper 80-1 (Nerenz & Webb, 1980). Averages for both grades at the two schools are presented in Table 3.

At school 452, as at the other public elementary schools in the district, all three elements of the WDRSD were implemented at both grade 2 and grade 5, although the emphasis on particular aspects of the program more nearly matched that of the developers at grade 2. In addition, more attention was reported to be paid to meeting individual needs at grade 2 than at grade 5. The WDRSD was not fully implemented at either grade at school 504 and one teacher noted that

> The staff as a whole...needs to make a commitment to either go all the way and use the Design, use it regularly and consistently throughout, or else come up with a different or a better idea. (Nerenz, 1979h, p. 97)

This statement is reflected not only in the use of only one element at each grade level but also in the mismatch of implementation to that recommended by the developers.

Initial Achievement

Scores from the first administration of the achievement monitoring tests were aggregated into 12 general objectives at grades 2 and 5 and percentages correct are reported by grade for both schools in Table 4. As shown, scores at school 452 are generally higher than those at school 504. Thus, for many of the general objectives, it is clear that initial levels of achievement were not the same at the two schools--a fact that should be considered when interpreting differences in means of instruction, time allocations, and subsequent achievement scores.

Table 3

Scores on the Program Use Scales

	Curriculum implementation						Customizing			
	Word attack	Study skills	Comprehension	Other	Teacher's resource file	Total (30)[a]	Adaptations	Review and reinforcement	Teacher-made Materials	Total (9)[a]
School 452										
Grade 2	12	6	5	0	2	25	3	2	1	6
Grade 5	2	8	8	0	2	20	0	0	1	1
School 504										
Grade 2	5	0	0	0	2	7	5	0	1	6
Grade 5	0	8	0	0	0	8	0	0	1	1

[a] Maximum possible points in parenthesis.

Table 4

Percentage Correct for Initial Achievement for 12 General Objectives

General Objective	Grade 2		Grade 5	
	School 452	School 504	School 452	School 504
1	89	83	66	79
2	58	54	-	-
3	53	42	55	29
4	58	42	70	68
5	58	52	-	-
6	63	60	71	58
7	83	73	80	64
8	-	-	60	49
9	-	-	-	-
10	71	63	58	54
11	41	29	67	59
12	63	67	51	44

IV

MEANS OF INSTRUCTION PROFILES

As part of the WDRSD descriptive study of Phase IV, information on the particular classroom procedures and materials used during WDRSD reading skills sessions was obtained from time-sampling observations of six target children. Specifically, four means of instruction variables were considered--pacing, grouping, materials, and interactions. Detailed descriptive information may be found in Project Papers 79-16, 79-19, and 80-1 (Nerenz, 1979a, 1979i; Nerenz & Webb, 1980). In that the means of instruction are discussed in terms of four different kinds of classroom time, the time variables are defined below:

Nonapplied time - - - the time within a class period that is spent in activities not directly related to reading skills instruction (wait, transition, management break, nonacademic, other-academic)

Available time - - - - the amount of time which is actually available for instruction once nonapplied time is subtracted from allocated time

Engaged time - - - - - the amount of time which students spend actively learning the designated content

Nonengaged time- - - - the amount of time during which students are not actively engaged with the content; the sum of the engaged and nonengaged time is equal to the available time

Summarizing that information, this portion of the paper develops a series of means of instruction profiles focusing on differences among individuals within a grade and differences between the same grade at the two schools.

School 452, Grade 2

Over the 17-week investigative period, a total of 18 40-minute classroom observations were conducted at school 452--10 during period A (weeks 1 through 8) and 8 during period B (weeks 11 through 17). Because Word Attack and Comprehension or Study Skills were both used daily, and since children were regrouped approximately every 2 weeks within each element of the curriculum program, over the total period a large number of children, 20, were observed. In addition, some children received instruction in both elements on a given day, others in only one. Thus, data were obtained for 6 to 10 children during each observation day. While this type of implementation of the WDRSD program reflects attention to individual needs across curriculum elements, it is difficult to systematically analyze differences among individuals on a day-by-day basis. The data discussed below are generally reported only for the total period and for periods A and B for each of the means of instruction variables.

Pacing and grouping. As shown in Table 5, grade 2 reading skills instruction was generally conducted in large group settings and paced by the teacher, with students working individually and determining the speed with which they would progress on a given task less than 25% of the available time, or about 6 minutes each day. This pattern holds for the observation periods and for many of the individual observation days, although there is considerable deviation from this manner of pacing and grouping during several of the class sessions, as shown in Table 6. Small group instruction was seldom used, accounting for less than 1 minute per day over the total period. Detailed information on

Table 5

Percent of Allocated and Available Times and Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 452, Grade 2)

Variable	Period A (10 days)			Period B (8 days)			Total Period		
	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
				Pacing					
Self	14	23	5	14	22	6	14	22	6
Other	48	77	18	48	78	20	48	78	19
				Grouping					
Individual	13	21	5	12	20	5	13	21	5
Small	1	2	0+[a]	3	5	1	2	3	1
Large	48	77	18	46	75	20	47	76	19
				Materials					
Paper and pencil	32	51	12	35	57	15	33	54	13
Printed	4	6	2	3	5	1	4	6	1
Manipulative	0	0	0	0	0	0	0	0	0
Game	1	2	1	0	0	0	1	1	0+[a]
Other	0	0	0	0	0	0	0	0	0
				Interactions					
Target → Teacher	2	3	1	1	2	0	1	2	1
Teacher → Target	0	0	0	0	0	0	0	0	0
Target ↔ Student	1	2	0+[a]	0	1	0+[a]	1	1	0+[a]
Target or Student → group	2	4	1	5	8	2	4	6	1
Teacher → Group	14	23	5	17	28	7	16	26	6

Note. Average time per class day is 40 minutes.

[a] 0+ designates a value less than .5.

Table 6

Variation by Day in Other Paced and Large Group Instruction

Observation day	Percent of time Other-paced instruction	 Large group instruction
4, 13, 14	100	100
16, 17	65	65
5	48	49

variations among students is not reported here for grade 2 at school 452 (see Nerenz, 1979i). It appears from the 4 days on which only six children were observed (days 2, 4, 5, 13) that, with the exception of variations due to differing amounts of time spent in the six categories of nonapplied time, there appear to be few differences in pacing and grouping for individual children.

Materials. Three types of materials were used during the observed sessions of WDRSD reading skills instruction, with paper and pencil materials (workbooks, work sheets) used slightly more than half of the available time during each period, between 12 and 15 minutes each day. Printed materials were used considerably less often and games were observed on only one occasion (day 5) during either period. It is interesting that the use of materials ranged from 0% (day 1) to nearly 100% (days 2, 8, 12) and that more than one type of material was used on only 4 of the 18 days (days 1, 3, 4, 5), all in period A (see Nerenz, 1979i). As was the case for the pacing and grouping categories, there appear to be few large differences among individuals for those days on which only six children were observed.

Interactions. Some form of verbal interaction was observed approximately 35% of the available time, for an average of about 8 total minutes per day. During each period, the largest number of interactions were in the form of teacher to large group (i.e., directions, explanations, questions), although even these signs of direct teacher instruction occurred only about one-fourth of the available time. Students were observed speaking to the group during approximately 1 minute of each lesson and were almost never observed speaking to each other. In addition, one-on-one interactions from observed students to the teacher occurred about 2% of the available time. Generally, there are few differences between periods or across days, and, because of the very small number of student-initiated interactions, differences among students appear to be minimal.

Summary. Overall in school 452, grade 2, WDRSD reading skills instruction appears to occur in large groups paced by the teachers about three-fourths of the time each day with the remainder spent with students working alone in self-paced settings. Verbal interactions took place during only a small portion of that time and were generally initiated by the teacher. Paper and pencil materials were used about half of the time and more than one type of material was seldom used on any particular day.

School 504, Grade 2

At grade 2, nine 29-minute observations were conducted during period A (weeks 1 through 8) and eight during period B (weeks 11 through 17) for a total of seventeen. As at school 452, more than six target children were observed during each period (10), although unlike school 452, only six children were observed on any particular day. Information on differences by period, within days, and among children is reported in Tables 7 and 8. Content-related instruction was observed on an average of 13 of the 29 minutes observed each day during period A, as opposed to 23 of the 29 minutes per day (79%) in period B; the remaining 50% of the allocated time in period A was spent in nonapplied categories. Although this may be due in part to the manner in which observations were scheduled, the difference in available time should be considered

Table 7

Percent of Allocated and Available Times and Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 504, Grade 2)

Variable	Period A (9 days)			Period B (8 days)			Total period		
	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
				Pacing					
Self	19	38	5	30	39	9	24	39	7
Other	30	62	8	46	61	14	38	61	1[illegible]
				Grouping					
Individual	18	36	5	25	33	7	21	34	6
Small	1	2	0+[a]	5	7	1	3	5	1
Large	30	62	8	46	61	14	38	61	11
				Materials					
Paper and pencil	30	62	9	39	51	12	35	56	10
Printed	0	0	0	5	6	1	2	4	1
Manipulative	0	0	0	0	0	0	0	0	0
Game	0	0	0	0	0	0	0	0	0
Other	0	0	0	1	1	0+[a]	0	1	0+[a]
				Interactions					
Target → Teacher	1	2	0+[a]	1	1	0	1	1	0+[a]
Teacher → Target	0	0	0	0	0	0	0	0	0
Target ↔ Student	1	2	0+[a]	1	2	0+[a]	1	2	0+[a]
Target or Student → Group	3	7	1	5	7	2	4	7	2
Teacher → Group	17	34	5	21	27	6	18	30	5

Note. Average time per class day is 29 minutes.

[a] 0+ designates a value less than .5.

Table 8

Range and Mean of Allocated Time in Percentages for Means of Instruction Variables for Each Observation Day (School 504, Grade 2)

	Observation day																	
	Period A									Period B								Mean over days
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Pacing																		
Self-paced	00 00	27 13	87 20	37 21	21 64	04 12	04 22	20 14	13 38	54 26	32 54	26 20	31 40	16 36	19 46	38 00	29 09	27 26
Other-paced	00 00	66 04	00 00	52 24	15 60	27 68	19 70	55 12	61 38	17 12	29 64	57 12	46 30	58 36	62 50	55 14	56 21	40 30
Grouping																		
Individual	00 00	27 13	77 20	39 21	22 64	05 12	04 22	18 14	13 38	46 26	25 58	26 20	29 40	16 36	15 34	23 12	29 09	24 26
Small group	00 00	00 00	10 20	02 12	00 00	00 00	00 00	02 12	00 00	08 26	11 42	00 00	02 12	00 00	03 12	15 38	00 00	03 10
Large group	00 00	66 04	00 00	52 24	15 60	27 68	24 70	55 12	61 38	17 12	29 64	57 12	46 30	58 36	62 50	55 14	57 21	40 30
Materials																		
Paper and pencil	00 00	36 22	87 20	62 11	31 74	20 56	28 70	46 50	13 38	57 26	21 46	42 40	60 34	55 14	21 26	38 00	41 21	39 32
Printed materials	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	00 00	26 66	03 10	00 00	00 00	07 42	00 00	00 00	02 07

Note. Within each day and category, the upper number is the mean for all students observed and the lower number is the range across students.

when comparing percentages for period A and B.

Pacing and grouping. Over the total observation period, and during periods A and B separately, students generally spent slightly less than two-thirds of their time in large group, other-paced activities. The remaining 40% of the available time was largely devoted to self-paced, individual work. Small group settings were observed only about 5% of the time, for an average of approximately 1 minute per day.

In contrast to this apparent lack of variation between periods there are large differences among students for individual observation days (Table 8). The percentage of allocated time spent in self-paced instruction ranged from less than 5% (days 1, 6, 7) to more than 80% (day 3). In addition, within a given day, individuals differed by as much as 64% (day 5) and as little as 0%, with individual children differing from each other by an average of 26% of the allocated time.

Similarly, the amount of allocated time spent in other-paced instruction ranged from less than 20% on days 1, 3, 5, 7, and 10 to more than 60% on days 2, 9, and 15, while within an individual day, students differed by an average of 30% of the allocated time. As shown in Table 8, there are comparable variations among days and ranges for each day across students for the three grouping categories.

Materials. As at school 452, paper and pencil materials were used more than half of the time during each period, although they were observed slightly more often during period A. As was the case for the pacing and grouping categories, students varied by about 32% in the amount of allocated time using paper and pencil materials, while the average time per day ranged from about 20% (days 6, 11, 15) to a high of 87% (day 3). Printed materials were observed only during period B and then for only about 6% of the available time. On the three days during which printed materials were used, however, as much as 26% of the available time was allocated to them (day 11), although there was considerable variation among students. It is interesting that more than a single material was used in only three of the eight observation days during period B and thus, for the total observation period, it appears that students worked with only one type of materials on 80% of the instructional days.

Interactions. Interactions were observed during about 40% of the available time. Teacher to group interactions were most frequently observed, accounting for approximately 30% of the available time. Interactions initiated by students directed either to the group, the teacher, or another student were observed an average of only two minutes each day.

Summary. Overall in school 504, grade 2, WDRSD reading skills instruction appears to occur in other-paced, large group situations about two-thirds of the time, with the remainder largely spent in self-paced, individualized work. Paper and pencil materials were generally the only materials used, and interactions were dominated by teacher-initiated speech.

Comparison of Schools 452 and 504, Grade 2

When comparing schools 452 and 504, several points should be considered. First, the amount of available time differs considerably by schools at grade 2, so students at one school received somewhat more skill instruction each day even though the time allocated to reading skills was about the same across schools. Second, while students received reading skills instruction in large group, other-paced settings slightly more often at school 452 than at school 504, in both instances, this was the predominant mode of instruction. In addition, small group instruction was infrequently used at either school. Third, instruction at both schools was characterized by the use of paper and pencil materials about half of the time, and at neither school was a variety of materials represented either on an individual day or across observation days. Finally, interactions were observed about one-third of the time at both schools and, in each case, teacher-initiated speech was observed in about 75% of the instances. Thus, although the two schools were located in very different demographic and geographical settings and even though their school characteristics and program use scores that differ considerably, the actual variations both in percentage of allocated and available time and in average number of minutes for four means of instruction variables are very similar for periods A and B and are almost identical for the total observation period.

In interpreting these similarities, however, one caution should be considered: Although it may be tempting to think of the percentages for the total or for the two individual periods as being representative of each separate observation, yielding a picture of very routine daily instruction with little variation among individuals, this is not always the case, especially at school 504. Thus it should be remembered that the data provided are averages across days and may represent the middle point between extremes rather than the actual amount of time spent in each category on a day-by-day basis.

School 452, Grade 5

Over the 17-week investigation period, a total of 16 40-minute observations were conducted--nine in period A (weeks 1 through 8) and seven in period B (weeks 11 through 17). As at grade 2, a large number of children (15) were observed, although, with the exception of days 13 and 14 when data were obtained for five individuals, only six students were considered on any particular day. As shown in Table 9, there are no large differences by period in either the average number of minutes per day (29) or in the percentage of allocated time available for actual reading skills instruction (75%).

Pacing and grouping. During both period A and period B students spent about 40% of the available time in self-paced settings and 60% in other-paced instruction. As was the case at grade 2, however, there was considerable variation across days during each period (Table 10); the percentage of self-paced activity ranged from 10% or less (days 4, 10, 13) to 50% or more (days 1, 2, 8, 16) and on any given day individuals varied in the amount of time spent in self-paced instruction by an average of 19%. Similarly, the amount of time per day in other-paced instruction varied from 6% (day 16) to 75% (day 5) with about 17% difference among individuals. Although the distribution of time in the two pacing categories was similar during periods A and B, the grouping categories differ considerably across periods.

During period A, the available time percentages for other-pacing are identical to those for large group work (59%) and students did nearly all of their self-paced activities working alone (37%). Small

Table 9

Percent of Allocated and Available Times and Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 452, Grade 5)

Variable	Period A (9 days) % of allocated time	Period A (9 days) % of available time	Period A (9 days) Average daily time per student (minutes)	Period B (7 days) % of allocated time	Period B (7 days) % of available time	Period B (7 days) Average daily time per student (minutes)	Total period % of allocated time	Total period % of available time	Total period Average daily time per student (minutes)
Pacing									
Self	30	41	12	34	45	13	32	43	12
Other	44	59	18	42	55	16	43	57	17
Grouping									
Individual	28	37	11	27	36	10	28	37	11
Small	3	4	1	27	35	10	13	17	5
Large	44	59	18	23	30	9	35	46	14
Materials									
Paper and pencil	63	85	25	66	86	25	64	85	25
Printed	5	7	2	11	14	4	8	10	3
Manipulative	0	0	0	11	14	4	4	6	2
Game	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0
Interactions									
Target→Teacher	0	2	1	0	1	0+[a]	1	2	1
Teacher→Target	0	0	0	0	0	0	0	0	0
Target↔Student	0	3	1	0	6	2	3	4	1
Target or Student →Group	0	9	3	0	7	2	6	8	2
Teacher→Group	0	14	4	0	23	7	14	18	5

Note. Average time per class day is 40 minutes.

[a] 0+ designates a value less than .5.

Table 10

Range and Mean of Allocated Time in Percentages for Means of Instruction Variables for Each Observation Day (School 452, Grade 5)

	Observation day																
	Period A									Period B							Mean over days
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Pacing																	
Self-paced	51 20	58 34	30 19	10 08	20 17	17 08	48 36	50 09	21 10	07 10	31 19	45 54	08 07	35 08	43 14	66 32	34 19
Other-paced	19 20	28 34	50 20	71 08	75 18	65 08	15 08	41 09	66 10	72 20	10 18	43 46	73 13	55 16	46 17	06 09	46 17
Grouping																	
Individual	51 20	35 28	30 20	08 08	19 17	17 08	48 35	50 09	21 10	07 10	30 19	00 00	10 07	35 08	42 14	66 31	29 15
Small group	00 00	24 17	00 00	00 00	02 09	00 00	00 00	00 00	00 00	00 00	02 09	69 18	73 13	55 16	01 07	00 00	14 13
Large group	19 20	27 39	50 20	71 08	75 18	63 08	15 08	41 09	66 10	73 20	09 08	19 26	00 00	00 00	46 17	06 09	36 14
Materials																	
Paper and pencil	58 19	80 09	40 30	76 16	73 10	81 08	51 35	88 08	78 08	76 10	39 26	72 01	78 12	73 15	64 00	66 31	68 15
Printed materials	00 00	00 00	00 00	00 00	00 00	00 00	48 48	00 00	00 00	00 00	37 19	00 00	00 00	00 00	33 14	00 00	07 05

Note. Within each day and category, the upper number is the mean for all students observed and the lower number is the range across students.

groups were observed only 4% of the available time. In contrast, in period B, there is no clear correspondence between pacing and grouping, and approximately one-third of the available time was spent in each of the grouping categories. This difference between periods is illustrated more clearly in Table 10 where variations by day are considered. Small groups were observed on only 2 days during period A for 24% and 2% of the allocated time (day 2, 5). In period B, small group work was observed on 5 of the 7 days, for from 1% to 73% of the allocated time. Across all days, however, students differed among themselves on any given day an average of 13%. Thus, while the averages for the pacing variable reported for the total period are, to a certain extent, reflective of the individual periods which they represent, this is less true for the three grouping categories.

Materials. As at grade 2, paper and pencil materials (worksheets, workbooks) were most frequently observed during each period (85% of the available time). Printed materials were also used during period A (7%) although they were only observed on a single day (day 7) for 48%, or about 19 minutes, of the allocated time. During period B, printed materials and manipulatives were each observed 14% of the time, with printed materials observed on 2 days (days 11, 15) and manipulatives observed on only 1 day (day 12). Duirng both periods, printed or manipulative materials were always used in conjunction with paper and pencil work and during neither period were materials used regularly over a number of days.

Interactions. Unlike the grade 2 profiles described above, at grade 5 interactions were nearly equally divided between teacher-initiated and student-initiated speech during period A: Teacher to group interactions were observed about 14% of the time; target student to teacher, student, or group interactions, 14%. This is less true in period B, when teacher-initiated speech was observed about 23% of the available time and student-initiated speech only about 14%. During both periods, some interaction was observed between 30% and 40% of the time.

Summary. Due to the variations between periods in groupings, materials, and, to a lesser extent, interactions, a "characteristic pattern of instruction" is more difficult to describe at grade 5 than at grade 2. Generally, however, it appears that students were other-paced in large groups about 60% of the time during period A and that they experienced more variety in grouping although not in pacing during reading skills instruction in period B. The apparent difference in materials between periods is deceptive, for the increase in printed materials and addition of manipulatives in period B occurred on only 1 instructional day. Thus, on 12 of the 16 days of observation, paper and pencil materials alone were used. Finally, interactions were observed about one-third of the time and shifted from those equally representative of teachers and students in period A to more teacher-dominated interactions in period B. However, the amount of student-initiated speech appears to be the same during each portion of the investigative period. As at grade 2, there is considerable variation across days for each means of instruction variable, while variations among students range from 5% (printed material) to 19% (self-pacing) of the allocated time.

School 504, Grade 5

At school 504, eight observations of the same six target children were made during each part of the 17-week investigation period. Unlike observations at school 452, however, the entire reading period was observed rather than simply the reading skills sessions, resulting in observations averaging 83 minutes each. Contrary to what might be expected, the percentages of allocated time reported in Table 11 are not much different from those at school 452 (Table 9), despite the fact that the extended data collection period included more diverse kinds of academic and nonacademic activities.

Pacing and grouping. Overall, students were largely self-paced during the total period (88%), with nearly all of their time (93%) spent in such settings during period B. On individual observation days during both periods, however, the percentage of time spent in self-paced instruction ranged from approximately 43% to 87% and individuals differed from one another by 41% of the allocated time (Table 12). The amount of other-paced instruction decreased from 18% to 7% from period A to period B, although there was still considerable variation among students across days: Differences among students averaged 24% of the allocated time and ranged from less than 10% on 4 days (days 2, 6, 11, 12) to more than 50% on days 7 and 8, both in period A. Thus, although the similarity between the figures provided for each observation period leads one to believe that there was considerable regularity in the means of instruction used during reading sessions, this is not entirely the case when individual days and children are considered.

Table 11

Percent of Allocated and Available Times and Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 504, Grade 5)

Variable	Period A (8 days)			Period B (8 days)			Total period		
	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
				Pacing					
Self	60	82	47	68	93	59	65	88	53
Other	13	18	10	5	7	4	9	12	7
				Grouping					
Individual	51	70	40	57	78	49	54	74	45
Small	14	19	11	13	18	12	14	19	11
Large	8	11	6	3	4	2	5	7	4
				Materials					
Paper and pencil	59	81	46	45	62	39	52	71	43
Printed	27	37	21	42	58	36	35	48	29
Manipulative	0	0	0	0	0	0	0	0	0
Game	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0
				Interactions					
Target → Teacher	1	1	1	2	3	2	2	2	1
Teacher → Target	0	0	0	0	0	0	0	0	0
Target ↔ Student	5	7	4	4	5	3	4	6	4
Target or Student → Group	2	2	1	0	0	0	1	1	1
Teacher → Group	6	8	4	3	4	2	4	6	4

Note. Average time per class day is 83 minutes.

Table 12

Range and Mean of Allocated Time in Percentages for Means of Instruction Variables for Each Observation Day (School 504, Grade 5)

Variable	Observation day																Mean over days
	Period A								Period B								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Pacing																	
Self-paced	43 57	59 50	50 33	53 30	83 19	87 20	75 66	64 51	49 64	79 40	73 24	61 56	79 30	80 27	70 57	83 38	68 41
Other-paced	31 35	16 09	08 48	23 20	05 23	02 10	12 62	18 56	14 17	02 14	09 06	00 04	00 00	00 00	07 44	06 33	10 64
Grouping																	
Individual	47 57	47 41	44 38	47 50	74 43	69 51	72 66	60 56	38 30	72 40	60 37	44 48	63 17	70 27	83 61	73 42	60 44
Small group	16 18	14 37	11 53	11 40	14 47	29 41	15 62	13 62	11 34	09 24	15 35	18 40	16 17	10 26	17 48	16 41	15 39
Large group	29 44	14 18	00 00	18 20	00 00	00 00	00 00	08 17	14 17	00 00	07 08	00 00	00 00	00 00	00 00	00 00	06 08
Materials																	
Paper and pencil	50 40	50 80	51 80	63 61	76 23	76 37	82 09	73 31	55 47	38 83	59 54	37 51	45 17	40 68	50 25	33 71	55 48
Printed materials	56 53	43 48	13 42	26 65	30 75	35 86	16 62	07 36	13 33	56 55	35 60	46 29	50 47	54 31	44 43	68 41	37 50

Note. Within each day and category, the upper number is the mean for all students observed and the lower number is the range across students.

The increase of 11% in the amount of available time spent in self-paced activities during period B is reflected, in part, in the three grouping categories, where the amount of time spent in individualized settings increased from 70% to 78% from periods A to B with a corresponding decrease in large group work. Over the two periods, however, small group instruction occurred during about 19% of the available time, and as shown in Table 12, was rather equally distributed over the 16 observation days. Even with this more regular distribution of time, students still differed from each other by an average of 39% per day.

Materials. Some form of materials was used about 119% (more than one material could be coded for a total of up to 500% during periods A and B) and both paper and pencil and printed materials were observed on each of the 16 observation days. While paper and pencil materials were more frequently used (81%) than printed materials (37%) in period A, both were used about 60% of the time during period B. The use of paper and pencil materials varied considerably by day (from 33% of the allocated time on day 16 to 82% on day 7) as did the use of printed materials (7% on day 8 to 68% on day 16). In addition, it is interesting that children differed from each other by an average of 50% per day and that, overall, both materials were used on a day-to-day basis.

Interactions. There are two interesting aspects of the interactions data at school 504. First, in contrast to information obtained at other schools and grades, interactions were observed less than 20% of the available time, or about 10 of every 60 minutes during the total observation period, compared with over 32% at school 452, grade 2, 31% at school 452, grade 5, and 39% at school 504, grade 2. In addition, during period B, only 7 minutes of interactions were coded, or 12% of the available time. Second, the interactions were not predominantly teacher-initiated. Rather, teachers initiated 4 minutes and 2 minutes of speech during periods A and B, while students initiated 6 and 5 minutes of interactions, respectively. However, even in what appears to be a highly individualized instructional setting no one-on-one interactions from teachers to target students were observed during either period.

Summary. At school 504 for grade 5, instruction almost always occurred in self-paced, individualized settings, with considerable use of small groups and pairs and an average of less than 4 minutes per day in large group instruction. Only paper and pencil and printed materials were observed, although they were each used on all of the observation days. While there generally were more student-initiated than teacher-to-group interactions, any form of interaction was infrequently observed.

Comparison of Schools 452 and 504, Grade 5

Overall, the pattern of grade 5 reading instruction appears to be quite different at the two schools. While students were self-paced approximately 43% of the time at school 452, self-paced settings were observed an average of 88% during the total period and as much as 93% during period B at school 504. Similarly, large group instruction was more frequently observed (46%) over the total period at school 452, although it must be remembered that these totals reflect very different usage during each period; at school 504, large group instruction accounted for only 7% of the available time with nearly three-fourths of the instructional period spent in individual work and 20% in small groups. Although both schools relied heavily on paper and pencil materials, at school 452 these were used almost exclusively on a day-to-day basis. At school 504, paper and pencil materials were always used in conjunction with printed material. Finally, there were considerably fewer total interactions at school 504 and students initiated more of them than did teachers; at school 452, students initiated fewer interactions than did teachers but in absolute numbers had more opportunities to speak. There are indications of considerable variation among individuals across days at each school and the difference in grouping strategies between periods A and B at school 452 are striking. However, students varied among themselves much less for the pacing, grouping, and materials categories at school 452 than at school 504. Thus, as at grade 2, the obtained percentages for periods A and B and for the total period may be deceptive in that they do not represent this larger amount of difference between the two schools. As noted previously, observations at school 504 were conducted during the entire reading period while those at school 452 reflect only the period of time allocated to skills instruction and may be less representative of the overall instructional pattern of reading instruction.

V

TIME PROFILES

Information on classroom time was obtained from two sources. The first, the teacher logs, provided an estimate of the amount of time which teachers allocated to reading skills instruction, and more specifically to Word Attack, Study Skills, and Comprehension objectives. The logs were maintained over 2 7-week periods for a sample of six randomly selected target students; a discussion of the logging procedure as well as a summary of the log data are available in Project Papers 79-21 and 79-31 (Nerenz, 1979a; Webb, 1979b). The second source of information about classroom time was the time sampling observations. As outlined in the previous chapter, 16 to 18 observations were conducted during the 17-week investigation period. Information was obtained on the several types of time--nonapplied time, available time, engaged time, and nonengaged time--which are defined at the beginning of section IV and detailed descriptions of the observation procedures, definitions, and unaggregated data are provided in Project Papers 79-16, 79-19, 80-1 and 79-32 (Nerenz, 1979i, 1979j; Nerenz & Webb, 1980; Webb, 1979a).

In this section of the report, time profiles are developed using information from the teacher logs and the observations. The distribution of time across and within days is first considered, including profiles of the number of instructional days over the two observation periods and the percentage of allocated, available, and average daily time. In addition, this total amount of time is reported for each of 12 general objectives to which it might have been allocated so that the interaction between time and reading skills content might be considered.

Grade 2

Distribution of Instructional Days

At both schools, the teacher logs were maintained for 14 weeks, a total of 70 instructional days. As shown in Table 13, the number of days which were available for reading skills instruction was then partitioned in order to determine the amount of time during which instruction was actually provided. At school 452, skills sessions were not scheduled on an average of 4 days during each period. In addition, target students were logged as absent an average of 5 days, so instruction was recorded as being provided on 57 of the 70 possible days, or 81% of the time. The total amount of instructional time is similar at school 504, where skill sessions were logged on 55 days, or 78% of the time. Absenteeism accounts for very few of the noninstructional days in either period; rather, reading skills instruction was not scheduled for 13 days, or almost 3 full weeks.

Allocated, Available, and Average Daily Time

More detailed information on the distribution of instructional time was collected using classroom observations and is reported for periods A and B and for the total period in Tables 14 and 15.

School 452. While teachers logged a total of 5 days on which students were absent (Table 13), observers found that students were absent over twice as much of the time during period A (13%) as period B (5%) and that they averaged 9% absenteeism, the equivalent of 6 logged days (Table 14). This discrepancy between the two data sources may be due in part to observer errors or to the fact that teachers generally

Table 13

Average Distribution of Instructional Days for Periods A and B and for the Total Period (Schools 452 and 504, Grade 2)

	School 452			School 504		
	Period			Period		
	A	B	Total	A	B	Total
Total number of days available for reading skills instruction	35	35	70	35	35	70
Average number of days during which reading skills instruction was not scheduled	4	4	8	8	5	13
Average number of days absent	3	2	5	2	0	2
Average number of days during which reading skills instruction was provided	28	29	57	25	30	55

Table 14

Percent of Allocated and Available Times and Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 452, Grade 2)

	Period A			Period B			Total Period		
Variable	% of allocated time	% of available time	Average daily time for student (minutes)	% of allocated time	% of available time	Average daily time for student (minutes)	% of allocated time	% of available time	Average daily time for student (minutes)
Absent	13	-	5	5	-	2	9	-	4
Nonapplied time	26	-	10	34	-	14	30	-	12
Available time	62	100	23	61	100	26	62	100	25
Engaged time	41	67	16	12	68	18	42	68	17
Nonengaged time	20	33	8	20	32	8	20	32	8
Total time for reading skills period	-	-	39	-	-	42	-	-	41

did not complete the logs on a day-by-day basis and thus the data provide only an estimate of the distribution of instructional time.

The next four categories provide estimates of the way in which time was used each day; there is little variation in these estimates across periods. As shown, 12 minutes, or about 30% of the observed time was spent in one of the six nonapplied categories. This resulted in approximately 25 minutes or 62% of the observed time being available for actual content instruction. Of this available time, students spent 17 minutes (68%) actively engaged in reading skills instruction and about 8 minutes (32%) in nonengaged activities. Thus, of the 41 minutes scheduled for reading skills each day, less than half were spent with students actually attending to the assigned material.

School 504. At school 504 (Table 15) observations showed that students were absent an average of 7% of the available time, the equivalent of 5 total days, compared with an average of 2 days indicated on the teacher logs. On the days during which instruction was provided, students spent an average of about one-third of the allocated time during the total period and as much as 40% during period A in nonapplied activities. Of the remaining available time, nearly 80% was spent in engaged activities during period A, or about 11 minutes per day. In contrast, while the percentage is lower during period B (62%), a slightly greater number of minutes (14) was actually spent actively on content. Overall, the total engaged rate of 12/29 minutes or 43% is almost identical to that at school 452 (12/41 or 42%) for grade 2 reading skills instruction.

Table 15

Percent of Allocated and Available Times for Average Daily Time from Observations for Means of Instruction and Interaction Variables (School 504, Grade 2)

	Period A			Period B			Total Period		
Variable	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
Absent	10	-	3	4	-	1	7	-	2
Nonapplied time	41	-	12	20	-	6	31	-	9
Available time	49	100	14	76	100	23	62	100	18
Engaged time	40	80	11	47	62	14	43	70	12
Nonengaged time	10	20	3	29	38	8	19	30	5
Total time for reading skills period	-	-	28	-	-	30	-	-	29

Time Profile by General Objective

Since data could have been obtained for over 80 objectives at grade 2, individual WDRSD skills were aggregated by WDRSD element and strand resulting in 31 specific objectives, 12 general objectives and three content areas, as illustrated in Figures 2 to 4. For each of the general objectives, information on log allocated time, observed time, engagement, and estimated total minutes is provided separately for the two schools.

School 452. At school 452 (Table 16), some time was allocated to all but two of the general objectives during period A and all but one of the objectives during period B. As would be expected at grade 2, the largest block of time, about 1,000 minutes, was allocated to Word Attack skills (01-05), with most time overall being spent on Vocabulary Meaning (05) and Structural Analyses (04) skills. Although considerable time was allocated to both skills, emphasis was placed on Vocabulary Meaning (05) during period A, while somewhat more time was allocated to Structural Analysis (04) during period B. The small amount of time allocated to Phonic Analysis overall may be due to the fact that data were collected during the second half of the school year and students may have already mastered most of these B- and C-level skills. This may be especially true for Phonic Analysis--Consonants (01) where considerably more time was allocated during period A than during period B.

Over twice as much time was allocated to Comprehension (06-09); 850 minutes) as to Study Skills (10-12; 340 minutes) over the total period. Passage and Sentence Meaning skills (06, 07) were allocated about the same amount of time in both periods, while all of the General Reading

Table 16

Time Allocation from Logs and Observations on General Objectives For One Student By Period (School 452, Grade 2)

General Objectives	Period A					Period B					Total period	
	Log allocated time (minutes)	Number of minutes observed of 233 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Log allocated time (minutes)	Number of minutes observed of 210 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Allocated time logged (minutes)	Estimate of total engaged time (minutes)
01 Phonic Analysis--Consonants	80	54	54	25	31	10	00	-	-	-	90	-
02 Phonic Analysis--Vowels	60	34	69	24	40	70	00	-	-	-	130	-
03 Phonic Analysis--Silent Letters	40	00	-	-	-	30	00	-	-	-	70	-
04 Structural Analysis	150	00	-	-	-	280	74	70	123	44	430	-
05 Vocabulary Meaning	250	61	67	102	41	120	47	68	48	40	370	150
06 Passage Meaning Skills	150	42	73	69	46	180	52	62	69	38	330	138
07 Sentence Meaning Skills	100	18	76	44	44	90	00	-	-	-	190	-
08 Word Meaning Skills	80	00	-	-	-	10	00	-	-	-	90	-
09 General Reading Time	00	00	-	-	-	240	00	-	-	-	240	-
10 Map Skills	50	00	-	-	-	180	23	71	76	42	230	-
11 Graph and Table Skills	60	24	76	28	47	50	14	68	22	44	110	50
12 Reference Skills	00	00	-	-	-	00	00	-	-	-	00	00

time (09) was observed during period B. More time was also logged for Study Skills during period B, although no time was recorded as being spent on Reference Skills (12) during either period.

During periods A and B, instruction was observed for about half of the 12 general objective areas. For the most part, areas which were not observed were allocated less than 100 minutes in either period (period A--03, 08, 09, 10, 12; period B--01, 02, 03, 07, 08, 12). However, considerable time was allocated to Skill 04 during period A and Skill 09 during period B, none of which was observed. While it could be possible that instruction occurred during week 14 when no observation was made, the teacher logs show that such is not the case; thus, instruction was logged for the equivalent of 10 41-minute sessions on these two skills for which no observational data were collected.

Engagement varied only slightly by content area, especially during period B, and it is clear that students actually were engaged during less than half of the allocated time. Thus, of the 280 minutes allocated to Structural Analysis (04) for period B, only an estimated 123 minutes, or 44%, were actually spent by students actively attending to the materials.

School 504. At school 504 (Table 17), some time was logged for all but one of the skills during each period and approximately two-thirds of the time during both periods was allocated to Word Attack Skills (01-05). During period A, Phonic Analysis--Vowels (02) and Silent Letters (03) were emphasized, while considerable time was spent on Phonic Analysis--Vowels and Structural Analysis (04) during period B. About 230 minutes were allocated to Comprehension Skills (06-09) during each period.

Table 17

Time Allocation from Logs and Observations on General Objectives For One Student By Period (School 504, Grade 2)

	Period A					Period B					Total period	
General Objectives	Log allocated time (minutes)	Number of minutes observed of 124 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Log allocated time (minutes)	Number of minutes observed of 180 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Allocated time logged (minutes)	Estimate of total engaged time (minutes)
01 Phonic Analysis--Consonants	83	23	73	30	36	6	00	-	-	-	89	-
02 Phonic Analysis--Vowels	159	33	88	69	43	194	46	53	78	40	353	147
03 Phonic Analysis--Silent Letters	103	39	74	37	36	10	00	-	-	-	113	-
04 Structural Analysis	66	18	83	27	41	358	113	66	179	50	424	206
05 Vocabulary Meaning	30	11	88	13	43	45	14	64	22	49	75	35
06 Passage Meaning Skills	31	00	-	-	-	4	00	-	-	-	35	-
07 Sentence Meaning Skills	14	00	-	-	-	9	00	-	-	-	23	-
08 Word Meaning Skills	13	00	-	-	-	5	00	-	-	-	18	-
09 General Reading Time	181	00	-	-	-	201	7	51	78	39	382	-
10 Map Skills	10	00	-	-	-	2	00	-	-	-	12	-
11 Graph and Table Skills	00	00	-	-	-	00	00	-	-	-	00	-
12 Reference Skills	6	00	-	-	-	44	00	-	-	-	50	-

However, nearly all of this was spent in General Reading (09) rather than on specific passage, sentence, or word meaning skills. Very little time was allocated to Study Skills.

With only one exception (Objective 09 - period B), all of the observations were conducted during Word Attack instruction. During period A, all five Word Attack objectives were observed, while during period B observations were conducted during instruction in three of the five areas. Generally, content areas which were not observed were allocated very small amounts of time or were scheduled during the reading block rather than the skills period, as was the case with Objective 09.

Within each period, it appears that engagement does not vary much by content taught. Overall, students were engaged about 42% during each period, indicating that for every 29-minute instructional session, students spent only about 12 minutes actively working with the particular reading skills.

Comparison of Schools 452 and 504, Grade 2

The use of time during grade 2 reading skills instruction appears to be very similar at the two schools. Although teachers logged more days without skills instruction at school 452, each school provided instruction on about 80% of the possible instructional days. Absenteeism differed by only 2% (school 452--9%; school 504--7%). Over all of the observation days, students spent 30% and 31% of the time in nonapplied activities and 62% was actually available for instruction. Of this, engagement averaged 68% at school 452, and 70% at school 504. Most of the observed and allocated time was devoted to Word Attack skills.

Although engagement appeared to differ only slightly by content at each school, it is interesting that somewhat different content was taught, with considerable time allocated to Vocabulary Meaning (05) at one school and to Phonic Analysis--Vowels (02) at the other. Structural Analysis skills (04) were taught at both schools for almost the same amount of time, 430 minutes at school 452, 424 minutes at school 504.

Grade 5

Distribution of Instructional Days

As at grade 2, logs were maintained for 14 weeks for a total of 70 possible instructional days, as shown in Table 18. At school 452, no reading skills instruction was logged on 17 of these days and an average of only one absent day was recorded. This resulted in a total of 52 instructional days or 74%. In contrast, at school 504 skills instruction was not scheduled on 4 days and children were logged as being absent an average of 2 days such that instruction was logged on 64 days, or 91% of the total time.

Allocated, Available, and Average Daily Time

More detailed information on the distribution of time within an average instructional day was obtained using classroom observations. This information is reported for both periods and for the total period separately for the two schools.

School 452. While both the logs and observations are in agreement about the number of days during which students were absent in period B (0), as at grade 2 there is some disagreement about the amount of absenteeism during period A: The observations report about 9% of the

Table 18

Average Distribution of Instructional Days for Periods A and B and for the Total Period (Schools 452 and 504, Grade 5)

	School 452			School 504		
	Period			Period		
	A	B	Total	A	B	Total
Total number of days available for reading skills instruction	35	35	70	35	35	70
Average number of days during which reading skills instruction was not scheduled	7	10	17	2	2	4
Average number of days absent	1	00	1	1	1	2
Average number of days during which reading skills instruction was provided	27	25	52	32	32	64

allocated time, the equivalent of 3 logged days, compared with 1 actually logged (Table 19). Nonapplied time averaged 19%, or 8 minutes per day. Of the 30 minutes of available time, 22, or 76%, were spent with students engaged and 7, or 24%, were observed in nonengaged activities. Thus, of the 40-minute reading period, students spent an average of 57%, or 22 minutes, actively learning reading skills.

School 504. At school 504 (Table 20), students were absent an average of 5% of the allocated time, or 4 logged days, identical to the number recorded on the logs for the total period and for periods A and B. As at school 452, about 22% of the allocated time was spent in nonapplied categories. As at school 452, students were actively engaged in learning the reading skills content slightly more than three-fourths of the remaining 61 minutes of available time, or about 56% of the allocated time. These percentages are only about 10% higher than those observed at grade 2. The grade 5 percentages are similar across schools in spite of the facts that the curriculum program was implemented quite differently at the two schools and that different amounts of instruction were observed.

Time Profiles by General Objective

In that data were obtained on over 100 separate objectives at grade 5, individual reading skills were aggregated into 12 general objectives as outlined in Figures 5 to 7.

School 452. At school 452 (Table 21), teachers allocated time to seven general objectives during period A and six in period B, three of which had considerable time logged during each period: 06, Passage

Table 19

Percent of Allocated and Available Times and Average Daily Time from Observations for Instructional Time Variables (School 452, Grade 5)

	Period A			Period B			Total period		
Variable	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
Absent	9	-	3	0	-	0	5	-	2
Nonapplied time	17	-	7	23	-	9	19	-	8
Available time	74	100	30	77	100	29	75	100	30
Engaged time	55	73	22	61	80	23	57	76	22
Nonengaged time	20	27	8	16	20	6	18	24	7
Total time for reading skills period	100	-	40	100	-	38	100	-	40

Table 20

Percent of Allocated and Available Times and Average Daily Time from Observations for Instructional Time Variables (School 504, Grade 5)

	Period A			Period B			Total period		
Variable	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)	% of allocated time	% of available time	Average daily time per student (minutes)
Absent	6	-	5	4	-	4	5	-	4
Nonapplied time	20	-	16	23	-	20	22	-	18
Available time	73	100	58	78	100	64	73	100	61
Engaged time	52	72	41	59	81	51	56	76	46
Nonengaged time	21	28	16	14	19	12	17	24	14
Total time for reading skills period	-	-	79	-	-	87	-	-	83

Table 21

Time Allocation from Logs and Observations on General Objectives For One Student By Period (School 452, Grade 5)

	Period A					Period B					Total period	
General Objectives	Log allocated time (minutes)	Number of minutes observed of 268 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Log allocated time (minutes)	Number of minutes observed of 204 minutes	% engaged of observed available time	Estimate of total engaged time (minutes)	Estimate % engaged of observed allocated time	Allocated time logged (minutes)	Estimate of total engaged time (minutes)
01 Phonic Analysis--Consonants	00	00	-	-	-	00	00	-	-	-	00	-
02 Phonic Analysis--Vowels	30	00	-	-	-	00	00	-	-	-	30	-
03 Phonic Analysis--Silent Letters	00	00	-	-	-	00	00	-	-	-	00	-
04 Structural Analysis	30	00	-	-	-	00	00	-	-	-	30	-
05 Vocabulary Meaning	00	00	-	-	-	00	00	-	-	-	00	-
06 Passage Meaning Skills	350	150	74	196	56	130	48	81	83	64	480	279
07 Sentence Meaning Skills	00	00	-	-	-	90	57	62	47	42	90	-
08 Word Meaning Skills	130	29	70	69	53	110	00	-	-	-	240	-
09 General Reading Time	70	00	-	-	-	130	00	-	-	-	200	-
10 Map Skills	240	58	68	122	51	250	35	86	167	67	490	289
11 Graph and Table Skills	240	31	81	144	60	00	00	-	-	-	240	-
12 Reference Skills	00	00	-	-	-	270	64	90	184	68	270	-

Meaning; 08, Word Meaning; 10, Map Skills. Because instruction in Word Attack skills (01-05) is generally completed by fifth grade, it is not surprising that it was allocated very little time. An almost equal emphasis on Study Skills and Comprehension is reflected in the fact that about the same number of minutes was spent on instruction in Comprehension (06-09) as in Study Skills (10-12) over the total period. The time is distributed somewhat more evenly among the skills during period B and all of the instruction in Graph and Table skills (11) was allocated during period A while Reference skills (12) were studied only during the last 8 weeks.

As indicated in the second column of figures for both periods, instruction was actually observed for four skills during each period. Although observations were generally conducted on a weekly basis, no data were obtained for week 14; this may account for the large amount of time allocated to objectives 08 and 09 for which instruction was not observed during period B. During period A the three objectives with time allocated but not observed had relatively little time allocated.

The engaged percent of observed available time and the estimated engaged percent of observed allocated time show the amount of engaged time for each general objective. With the exception of data for Sentence Meaning skills (07) during period B, these do not differ considerably from the overall engagement rates regardless of content reported in Table 19. These figures serve to further emphasize the discrepancy between allocated time and productive, or engaged, time which has been highlighted throughout the time profiles. For example, although teachers allocated the equivalent of 10 35-minute sessions to Passage Meaning skills (06) during period A, students were observed actively learning the material only 56% of the time (196 minutes). During period A, it is clear that slightly more than half of the time set aside by teachers for instruction in any particular skill was actually spent in those pursuits. While estimates are not available for two skills and appear to be higher for three of the other four during period B, the average percent of allocated time is still only 61% (Table 19).

The log allocated time and estimated engaged time for the total period, given in the last two columns of the table, indicate that overall at school 452, the most time was devoted to Passage Meaning (06) and Map skills (10) with half as much time spent in each of the four other areas (08, Word Meaning; 09, General Reading; 11, Graph and Table skills; and 12, Reference skills) and very little time in the six remaining objectives. In addition, they provide summaries of the difference between allocated time and active learning time over the 17-week investigation period.

School 504. At school 504 (Table 22), some time was logged for 10 of the 12 content areas (Table 21), although, as at school 452, very little time was allocated to Word Attack skills (01-05). In addition, since data were obtained for the entire reading period, it is understandable that the General Reading category should have the largest amount of time. With the exception of this category, Comprehension (06-08) and Study Skills (10-12) were allocated exactly the same number of minutes (530) during period A, while teachers logged almost twice as much Comprehension instruction as Study Skills instruction during period B. In addition, emphasis was placed on the same skills within each element

Table 22

Time Allocation from Logs and Observations on General Objectives For One Student By Period (School 504, Grade 5)

General Objectives	Period A: Log allocated time (minutes)	Period A: Number of minutes observed of 458 minutes	Period A: % engaged of observed available time	Period A: Estimate of total engaged time (minutes)	Period A: Estimate % engaged of observed allocated time	Period B: Log allocated time (minutes)	Period B: Number of minutes observed of 508 minutes	Period B: % engaged of observed available time	Period B: Estimate of total engaged time (minutes)	Period B: Estimate % engaged of observed allocated time	Total period: Allocated time logged (minutes)	Total period: Estimate of total engaged time (minutes)
01 Phonic Analysis--Consonants	00	00	-	-	-	00	00	-	-	-	00	-
02 Phonic Analysis--Vowels	10	7	84	5	60	00	00	-	-	-	10	-
03 Phonic Analysis--Silent Letters	00	00	-	-	-	00	00	-	-	-	00	-
04 Structural Analysis	10	7	73	7	70	00	00	-	-	-	10	-
05 Vocabulary Meaning	80	7	99	58	72	10	3	58	4	40	90	62
06 Passage Meaning Skills	300	61	74	163	54	240	31	90	155	64	540	318
07 Sentence Meaning Skills	70	3	81	40	57	20	00	-	-	-	90	-
08 Word Meaning Skills	160	58	77	92	58	160	36	80	97	61	320	189
09 General Reading Time	1080	205	65	514	48	1540	400	80	901	58	2620	1415
10 Map Skills	60	76	76	35	58	20	2	100	12	60	80	47
11 Graph and Table Skills	20	7	35	6	30	30	8	85	16	53	50	22
12 Reference Skills	450	87	78	257	57	190	28	82	115	60	640	372

across periods, with Passage Meaning (06), Word Meaning (08), and Reference skills (12) receiving the most allocated time.

Even more than at school 452, time was observed in the content categories for which log information was recorded and observations sampled at least 15% of the time allocated to each objective during each period. This is interesting in that observations were not conducted during weeks 6 and 12 and thus there exist more periods of instruction which are not represented in the observational data at this school than at school 452.

The engaged of observed available percentage time generally ranged from mid-70s to low-80s for period A, and 80 or above during period B. It is possible that in several instances, variations are due to the small amount of time observed (Objectives 5 and 11, period A - 7 minutes; Objective 5, period B - 3 minutes; Objective 10, period B - 2 minutes). As at school 452, it appears that students are engaged during slightly more than half of the allocated time, with percentages ranging from 30% to 72% during period A and 40% to 64% during period B. Thus, of the 300 minutes allocated to Passage Meaning (06) in period A, students were engaged for 162 minutes, the equivalent of four 40-minute sessions, and were observed in other activities for almost 140 minutes or three and one-half 40-minute sessions. Similar differences between productive learning time and "planned" time are provided for the total period in the last two columns.

Comparison of Schools 452 and 504, Grade 5

As was the case for grade 2 reading skills instruction, there are several similarities across the two schools at grade 5. Students were absent 5% of the time at each school; about 20% of the allocated time was spent in nonapplied categories, available time averaged about 75%, and students were engaged 76% of the available time at each school or about 57% of the allocated time. Instruction was observed in nearly all of the content areas and little Word Attack time was scheduled at either school.

However, the schools also differed on several points. At school 452, only 74% of the possible number of instructional days were actually used for skills instruction, compared with 91% at school 504, the difference being due to the fact that teachers did not schedule instruction on 17 days during the investigation period. In addition, skills instruction at school 452 focused almost equally on Study Skills and Comprehension, while at school 504, Comprehension was allocated over four times as much. This difference is due largely to the fact that all reading instruction was observed at school 504 where General Reading was logged 2,620 minutes.

VI

ACHIEVEMENT PROFILES

Achievement profiles were developed from two types of measures, each administered on three occasions (weeks 1, 9, 18). The achievement monitoring procedure provided a means of assessing achievement for a group of students--in this case, the class or the unit. Because the set of two to four items testing each skill was divided among four test forms and one-fourth of the students completed each form at a given administration, detailed achievement data were obtained for a large number of skills with a minimal amount of time spent in testing. However, because this matrix-sampling procedure was used in developing the tests, information was not obtained about individual students' achievement. At grade 2, 30 objectives were tested: 19 Word Attack, 5 Comprehension, and 6 Study Skills. At grade 5, 26 objectives were tested: 3 Word Attack, 6 Comprehension, and 17 Study Skills.

In addition to the achievement monitoring tests, a domain referenced testing procedure was used to obtain information on each student for a much smaller number of reading skills (Harris & Pearlman, 1978). Based on an operational definition of the domain, eight or nine test items were developed for each of three objectives and tests were administered to all of the students at each test time. More detailed information on the development of both types of tests as well as unaggregated data for each test administration are provided by Dunham, Nerenz, and Webb (1979) and by Nerenz (1979b, 1979c, 1979d, 1979e, 1979f, 1979g).

The achievement profiles discussed below provide several kinds of information. Students' growth over the three administrations of the achievement monitoring tests as well as the overall gain from test time 1 to test time 3 are included for the general objectives which were tested at each grade level. In interpreting these results, it is important to remember that each form of the achievement monitoring tests was administered to one-fourth of the group at any one testing and thus the percentage correct for each objective is generally based on scores from only one-half to three-fourths of the listed number of students.

Although item analyses indicated irregularities in the items themselves for several of the domain referenced subtests, especially at grade 5 (see Nerenz, 1979e, 1979f, 1979g), results are reported for all three subtests and administrations at each grade level. Unlike analyses which provide a simple estimation of the percentage correct, the domain referenced analysis yields two estimates--one for the item $\hat{k}(1-\hat{x}_t)$ and one for the entire domain $\hat{k}$--and thus reflects the amount of growth on particular aspects of the domain as well as for the domain as a whole.

Finally, although they are based on different types and numbers of items, the percentage of correct responses for the three skills which were assessed using each testing procedure is provided. Domain referenced test scores for the total group and for the six target children for whom log allocated time was recorded are also included so that the representativeness of that sampled group might be considered.

Grade 2

Across the four test forms, 80 items were used to test 10 of the 12 general objectives: 5 Word Attack (01-05), 2 Comprehension (06, 07), and 3 Study Skills (10-12). These items were not evenly distributed across elements or across general objectives within each element but rather were designed to reflect the content that teachers had anticipated teaching (see Dunham, Nerenz, & Webb, 1979).

Achievement Monitoring Scores

At test time 1 for school 452 (Table 23), students achieved more than 80% correct on two general objectives (01--Phonic Analysis-Consonants and 07--Sentence Meaning Skills) and appear to have already mastered the material. Over the investigation period, they generally maintained this level of performance for one skill (07) and continued to improve on the other. Scores ranged from 41% to 71% correct on the eight other skills. Large gains from test time 1 to test time 3 were evidenced for two objectives, Phonic Analysis-Silent Letters (03) and Reference Skills (12), and mastery was achieved on the latter by test time 3. It is also interesting that students improved greatly on Skill 06--Passage Meaning from test time 1 (63%) to test time 2 (86%), but that from test time 2 to test time 3 their mastery declined, resulting in

Table 23

Percent Correct for Three Administrations of the Achievement Monitoring Tests and Gain Score For General Objectives (School 452, Grade 2)

General objectives	Number of items in aggregate	Percent correct Test time 1 (n=45)	Test time 2 (n=46)	Test time 3 (n=47)	Gain (TT3-TT1)
01	17[a]	89	91	94	5
02	14	58	63	63	5
03	3	53	64	68	15
04	10	58	58	63	5
05	8	58	68	66	8
06	7	63	86	73	10
07	5	83	80	81	-2
08	0	-	-	-	-
09	0	-	-	-	-
10	8	71	66	76	5
11	5	41	49	49	8
12	3	63	63	81	18

[a] Only 16 items were included at test time 3.

an overall gain of only 10%. Gains in achievement for the five remaining content areas were positive but ranged from only 5 to 8%.

At school 504 (Table 24), students had already mastered Word Attack Phonic Analysis-Consonants (01) at test time 1 and maintained that mastery throughout the observation period. Scores ranged from 29% correct on Graphs and Tables (11) to 73% correct on Sentence Meaning (07) for the nine remaining skills, with the Word Attack skills (02-05) ranging from 42 to 54% and the Comprehension and Study Skills (06, 07, 10-12) averaging somewhat higher, about 63% correct.

Students achieved mastery on one skill (07--Sentence Meaning) by test time 3 and made steady progress with an improvement of at least 10% on another three objectives (04, 05, 06), although they still did not achieve mastery levels. Little or no overall gain was evidenced for skills 02 and 03 (Phonic Analysis-Vowels and Silent Letters). There is also a decline in performance from test time 1 to test time 2 for Objective 10--Map skills.

Domain Referenced Scores

The first of the three domain referenced subtests (Table 25) contained nine items from Word Attack skills B5, C3, and D2 and tested two- and three-letter consonant blends. At both schools, it is clear from the large $\hat{k}$ that the domain as a whole was very easy for the students at all three administrations, although it was slightly less easy at school 504 at test time 1 and these students showed more overall gain. Examination of the test items shows one two-letter blend item at each

Table 24

Objective Easiness for Three Administrations of the Achievement Monitoring Tests and Gain Score For General Objectives (School 504, Grade 2)

General objectives	Number of items in aggregate	Objective easiness			Gain (TT3-TT1)
		Test time 1 (n=61)	Test time 2 (n=64)	Test time 3 (n=62)	
01	17[a]	83	84	82	-1
02	14	54	62	54	0
03	3	42	56	46	4
04	10	42	52	55	13
05	8	52	59	65	13
06	7	60	65	76	16
07	5	73	80	86	13
08	0	-	-	-	-
09	0	-	-	-	-
10	8	63	53	54	-9
11	5	29	29	38	9
[illegible]2	3	67	69	71	4

[a] Only 16 items were included at test time 3.

Table 25

Harris-Pearlman Item and Domain Difficulty for
Subtest 1: Consonant Blends
(Schools 452 and 504, Grade 2)

Item	School 452		School 504	
	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$
Test time 1				
1	.94		.88	
2	.86		.73	
3	.83		.82	
5	.74		.69	
6	.92		.79	
7	.84		.76	
9	.84		.61	
10	.76		.49	
11	.74		.59	
		.96		.89
Test time 2				
1	1.00		.89	
2	1.00		.88	
3	.70		.34	
4	1.00		.86	
5	1.00		.81	
6	1.00		.84	
7	.81		.58	
8	.87		.69	
9	.72		.39	
		1.00		.98
Test time 3				
1	.92		.96	
2	1.00		.94	
3	.99		.93	
4	.62		.74	
5	.98		.88	
6	.83		.74	
7	.71		.66	
8	.29		.25	
9	.81		.75	
		1.00		.98

test administration on which students scored considerably lower. At test times 1 and 3, items 5 and 4 respectively tested the blend *sk* in the nonsense words *sked* and *skackle*. Item 3 at test time 2 used the stimulus word *cragment*. These two blends may have been more difficult or the students may have been misled by the nonsense words themselves. In addition, the last three items in each administration tested three-letter blends and were also generally more difficult, especially at school 504.

As was the case on subtest 1, subtest 2--Central Thought: Topic of a Passage without Organizer (CC C3) was relatively easy at all three test administrations, with students scoring almost identically across the two schools (Table 26). Although the test was developed to measure the skill in four independent and four dependent passages, at least two of the independent paragraphs at test time 1 (items 16, 17) and 2 (items 10, 13) are structurally more like dependent passages and, at all three test times, items having more features of independent passages appear to be somewhat easier.

Two aspects of the Alphabetizing skill (SS C11) were tested on subtest 3--Alphabetizing by the first letter or by the first and second letters (Table 27). At both schools, it appears that alphabetizing by the first and second letters was generally easier, especially at test times 1 and 3, perhaps because the second letter was often a vowel and thus the ordering process was considerably simplified. Unlike subtests 1 and 2, for subtest 3 the domain difficulty ($\hat{k}$) is quite different across schools: Students at school 452 started lower and gained 13% to

Table 26

Harris-Pearlman Item and Domain Difficulty for Subtest 2: Central Thought Topic of a Passage without an Organizer (Schools 452 and 504, Grade 2)

	School 452		School 504	
Item	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$
	Test time 1			
13	.10		.03	
14	.77		.75	
16	.65		.35	
17	.30		.12	
18	.57		.60	
19	.35		.28	
20	.39		.32	
22	.56		.39	
		.88		.89
	Test time 2			
10	.15		.09	
11	.58		.47	
12	.83		.79	
13	.45		.29	
14	.64		.52	
15	.42		.41	
16	.72		.62	
17	.57		.32	
		.85		.86
	Test time 3			
10	.95		.94	
11	.74		.73	
12	.86		.89	
13	.76		.81	
14	.59		.47	
15	.70		.79	
16	.49		.50	
17	.46		.43	
		.95		.95

Table 27

Harris-Pearlman Item and Domain Difficulty for Subtest 3: Alphabetizing (Schools 452 and 504, Grade 2)

	School 452		School 504	
Item	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$
	Test time 1			
23[a]	.61		.70	
24[a]	.59		.57	
25	.56		.67	
26[a]	.62		.68	
27	.55		.58	
28[a]	.62		.69	
29	.43		.51	
32	.49		.57	
		.72		.77
	Test time 2			
18	.68		.64	
19[a]	.64		.60	
20	.62		.55	
21[a]	.60		.66	
22[a]	.69		.64	
23	.56		.48	
24	.64		.51	
25[a]	.56		.40	
		.84		.71
	Test time 3			
18[a]	.76		.59	
19[a]	.74		.61	
20[a]	.65		.58	
21	.70		.53	
22	.51		.53	
23	.64		.60	
24	.48		.44	
25[a]	.68		.62	
		.85		.72

[a] These items test alphabetizing by the first and second letters.

reach mastery while students at school 504 had higher initial achievement with scores declining by 6% over the last two testings.

Overall, students performed well on all three domain referenced subtests although there were no large gains in achievement over the three test administrations. It is clear, however, that while the domains as a whole were generally easy, portions of the domain as well as particular items within each part were somewhat more difficult for these students.

Comparison of Target Students to Total Group

Comparison of achievement scores provides an estimate of the representativeness of the children for whom logs were maintained by comparing their percentage correct on the domain referenced tests with those of the total group. At school 452 (Table 28), average scores for the total group and the six-student subgroup differed by less than 1 point. At school 504 (Table 29), average scores of the two groups differed from .6 to 2.5 points with only four of the nine differences less than 1 point. Thus, the students for whom logs were maintained at school 504 are somewhat more proficient than the total group with regard to the Comprehension and Study Skills objectives which were tested and the logs may reflect a profile of instructional time for more advanced students rather than for the average grade 2 child.

Contrast Between Schools on Achievement

Students at schools 452 and 504 had mastered skill 01--Phonic Analysis-Consonants at test time 1. At school 452, initial achievement

Table 28

Achievement Scores for Three WDRSD Reading Skills: Achievement Monitoring Percentage Correct for the Total Group and Domain Referenced Percentage Correct, Mean, and Standard Deviation for the Total Group and for Six Target Students (School 452, Grade 2)

Basic Objectives[a]		Test time 1				Test time 2				Test time 3			
		Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students
Consonant blends (CA B5, C3, D2)		.97	.96	.83	.87	.97	1.00	.90	.91	.96	1.00	.79	.85
	Mean			7.5	7.8			8.1	8.2			7.1	7.7
	SD			1.8				1.[illegible]				1.0	
Central thought: Passage without organizer (CC C3)		.73	.88	.46	.44	.87	.85	.54	.64	.80	.95	.69	.67
	Mean			3.7	3.5			4.4	[illegible]			5.6	5.3
	SD			1.8				2.1				1.7	
Alphabetizing (SS C11)		.64	.72	.56	.50	.65	.84	.62	.54	.81	.85	.64	.67
	Mean			4.5	4.0			5.0	4.3			5.1	5.3
	SD			3.0				2.5				2.4	

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[a] Consonant blends were tested using eight items on the Achievement Monitoring Tests and nine items on the Domain Referenced Tests; two and eight items were included for the central thought objective, and three and eight items were used to test Alphabetizing on the two types of tests.

Table 29

Achievement Scores for Three WDRSD Reading Skills: Achievement Monitoring Percentage Correct for the Total Group and Domain Referenced Percentage Correct, Mean, and Standard Deviation for the Total Group and for Six Target Students (School 504, Grade 2)

Basic Objectives[a]		Test time 1				Test time 2				Test time 3			
		Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students
Consonant blends (WA B5, C3, D2)		.79	.89	.70	.78	.87	.92	.70	.80	.94	.98	.76	.85
	Mean			6.4	7.00			6.3	7.2			6.8	7.7
	SD			2.5				2.2				1.5	
Central thought: Passage without organizer (CC C3)		.56	.89	.36	.50	.60	.86	.44	.56	.91	.95	.70	.85
	Mean			2.8	4.00			3.6	4.5			5.6	6.8
	SD			1.5				1.8				1.7	
Alphabetizing (SS C11)		.67	.77	.62	.79	.69	.71	.56	.81	.71	.72	.56	.88
	Mean			5.0	6.3			4.5	6.5			4.5	7.0
	SD			2.9				3.0				3.0	

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[a] Consonant blends were tested using eight items on the Achievement Monitoring Tests and nine items on the Domain Referenced Tests; two and eight items were included for the central thought objective, and three and eight items were used to test Alphabetizing on the two types of tests.

in skill 07--Passage Meaning was also high and by test time 3, students had mastered one additional skill, although this differed by school. At neither school, then, was a mastery level of 80% or more correct achieved for a majority of the general objectives for which data were obtained.

Variations in initial achievement and type of progress were also clear. At school 452, there was very little difference in initial achievement for many of the skills, and substantial gains were made for only two objectives (03, 12) with the percent correct for one objective (05) declining by test time 3. At school 504 there was considerable difference in initial scores such that a Word Attack skills group and a Comprehension and Study Skills group might be considered. Steady gains across test times were evidenced for four objectives (04, C5, 06, 07), with gains in two areas (02, 03) and achievement in one area (10) declining over time.

The attainment of a mastery level on the skills tested using both procedures seems to vary depending on the measure considered, with students at both schools making gains on Consonant Blends and Central Thought, while in Alphabetizing, scores at school 452 improved and at school 504, declined. The representativeness of the random sample of students for whom logs were maintained might also be carefully considered in that their scores on the domain referenced tests at school 504 were consistently higher than those of the total group.

Grade 5

At grade 5, the 80 test items on the four test forms were divided such that 8 items tested three of the five Word Attack general objectives, 20 items tested three of the four Comprehension objectives, and 52 items were partitioned among the three Study Skills areas. As at grade 2, this allocation of test items was based on teachers' perceptions of the content to be covered as well as suggestions made by the developers of the WDRSD program.

Achievement Monitoring Scores

At school 452 (Table 30), students had mastered only one objective (07--Sentence Meaning) at test time 1 and this was the only skill for which achievement reached 80% at the final testing. Students made substantial gains in two additional areas from test time 1 to test time 2 (01--Phonic Analysis-Consonant Blends and 08--Word Meaning) but achievement declined by test time 3. For the remaining skills, students evidenced either small gains or slight decline. A pattern of steady growth across test administrations is not reflected in these scores.

At school 504 (Table 31), students had not mastered any of the skills at test time 1. They mastered one (01--Phonic Analysis-Consonants) by test time 3 and had substantial gains on three others: 03--Phonic Analysis-Silent Letters, 06--Passage Meaning, and 08--Word Meaning. For two of the skills (10, 12) there is almost no change in achievement, but for one other (11) the gain is more steady, with two others (04, 07) showing gain from test time 1 to test time 2 and loss from test time 2 to test time 3.

Table 30

Objective Easiness for Three Administrations of the Achievement Monitoring Tests and Gain Score for General Objectives (School 452, Grade 5)

		Objective easiness			
General objectives	Number of items in aggregate	Test time 1 (n=39)	Test time 2 (n=40)	Test time 3 (n=40)	Gain (TT3-TT1)
01	3	66	97	74	8
02	0	-	-	-	-
03	3	55	63	50	-5
04	2	70	75	74	4
05	0	-	-	-	-
06	10	71	71	62	-9
07	4	80	88	80	0
08	6	60	80	74	14
09	0	-	-	-	-
10	16	58	63	64	6
11	12	67	73	76	9
12	24	51	53	48	-3

Table 31

Objective Easiness for Three Administrations of the Achievement Monitoring Tests and Gain Score for General Objectives (School 504, Grade 5)

General objectives	Number of items in aggregate	Objective easiness			Gain (TT3-TT1)
		Test time 1 (n=62)	Test time 2 (n=60)	Test time 3 (n=60)	
01	3	79	69	84	5
02	0	-	-	-	-
03	3	29	46	47	18
04	2	68	77	74	6
05	0	-	-	-	-
06	10	58	62	74	16
07	4	64	78	73	9
08	6	49	68	70	21
09	0	-	-	-	-
10	16	54	51	53	-1
11	12	59	61	68	9
12	24	44	43	45	1

Overall, it is clear that students did not reach a mastery level of 80% correct for a large number of the skills although they did score better than 70% correct on five of the nine areas tested. Substantial gains are more evident at school 504 than school 452, although at neither school does there appear to be consistency on many objectives over time.

Domain Referenced Scores

On the first subtest, Outlining (SS F 11), students scored over 80% correct at all three test times with a gain of 8% at school 452, and over 80% correct at test times 1 and 3 at school 504 with a loss of 5% (Table 32). In that three items were developed for each of three test passages on each form, it appears, especially at test time 1, that the passages themselves were harder or easier to outline. Over the three test times, items which were more difficult often seemed to have too many or too few major points or had qualifying phrases such that the major points were not easily identified simply by the layout of the text.

On the second subtest, Indirect Clue-Application, students were to complete a sentence containing a nonsense word and then to define the nonsense word on the basis of context clues provided in the text (Table 33). Students at school 452 improved over the testing

Table 32

Harris-Pearlman Item and Domain Difficulty for Subtest 1: Outlining (Schools 452 and 504, Grade 5)

Item	School 452		School 504	
	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$
Test time 1				
1	.14		.38	
2	.60		.59	
3	.30		.33	
4	.79		.86	
5	.75		.83	
6	.77		.80	
7	.64		.79	
8	.63		.64	
9	.67		.76	
		.86		.88
Test time 2				
1	.37		.38	
2	.40		.46	
3	.66		.71	
4	.47		.44	
5	.70		.57	
6	.42		.39	
7	.58		.58	
8	.40		.39	
9	.25		.14	
		.85		.75
Test time 3				
1	.70		.48	
2	.18		.21	
3	.57		.68	
4	.75		.75	
5	.87		.81	
6	.71		.68	
7	.82		.78	
8	.94		.71	
9	.85		.70	
		.94		.83

Table 33

Harris-Pearlman Item and Domain Difficulty for Subtest 2: Indirect Clues--Application (Schools 452 and 504, Grade 5)

Item	School 452 $\hat{k}(1-\hat{x}_t)$	School 452 $\hat{k}$	School 504 $\hat{k}(1-\hat{x}_t)$	School 504 $\hat{k}$
		Test time 1		
13	.44		.45	
15	.31		.34	
16	.68		.69	
18	.52		.53	
19	.02		.02	
20	.18		.10	
21	.58		.70	
22	.36		.36	
		.73		.77
		Test time 2		
10	.50		.56	
11	.28		.23	
12	.56		.58	
13	.44		.45	
14	.24		.11	
15	.50		.53	
16	.43		.48	
17	.36		.40	
		.74		.72
		Test time 3		
10	.66		.66	
11	.57		.30	
12	.44		.27	
13	.18		.19	
14	.49		.43	
15	.21		.37	
16	.64		.64	
17	.26		.08	
		.84		.76

period, with the domain difficulty estimated at .84 at test time 3. At school 504, scores declined at test time 2 and returned to their original level at test time 3. The low scores for items 19 and 20 at test time 1 and item 11 at test time 2 are due to the fact that the nonsense terms might logically be replaced by a variety of English words, only one of which was considered correct. Other low scores appear to be due to the difficulty of the English word (estimate, frontier/wilderness, lingered, disturbance). There was no evidence that either the particular type of clues (contrast, modifying phrase, example, cause and effect) or the part of speech replaced (noun, verb, adjective, adverb) had an effect on the difficulty of the item.

On subtest 3 (Table 34), students were to read a paragraph and determine whether the conclusion which was provided was correct, justifying their assessment using two facts from the passage. This subtest was very difficult for students at both schools at test time 1 ($\hat{k}$ = .51, .58) although the domain difficulty rose to .86 and .83 by test time 2 and steadied at .79 by test time 3. There are very few items for which the low scores may be explained by the item construction itself. Students tended to score higher on items for which an incorrect rather than a correct conclusion was provided; it is possibly easier to find facts denying an inconsistent conclusion than to verify a correct one.

Comparison of Target Students to Total Group

An estimate of the representativeness of the children for whom logs were maintained is provided by comparison of their average scores

Table 34

Harris-Pearlman Item and Domain Difficulty for Subtest 3: Conclusions--Indirect Relationships (Schools 452 and 504, Grade 5)

Item	School 452		School 504	
	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$	$\hat{k}(1-\hat{x}_t)$	$\hat{k}$
	Test time 1			
23[a]	.36		.45	
24	.39		.50	
25[a]	.32		.22	
26	.28		.29	
27	.20		.23	
28[a]	.36		.44	
29	.21		.27	
30[a]	.23		.31	
		.51		.58
	Test time 2			
18[a]	.70		.68	
19	.74		.66	
20	.59		.52	
21	.33		.17	
22	.63		.63	
23[a]	.52		.53	
24[a]	.55		.57	
25[a]	.62		.58	
		.86		.83
	Test time 3			
18	.76		.53	
19[a]	.75		.43	
20[a]	.89		.65	
21	.70		.33	
22[a]	.77		.60	
23	.47		.35	
24[a]	.47		.45	
25	.63		.49	
		.79		.79

[a] For these items, incorrect conclusions were provided.

with those of the total group. At school 452 (Table 35), the sampled six-student subgroup scored higher in seven of the nine instances. At school 504 (Table 36), scores for the two groups differed from .7 to 2.2 points with the subgroup for which logs were maintained having higher scores in each of the nine comparisons. As at grade 2 at school 504, the logs may present a profile of time allocations which are not reflective of the typical pattern of grade 5 reading skills instruction.

Contrast Between Schools on Achievement

Students evidenced only small changes in achievement for all but a small number of the 12 general objectives at each school, with larger gains for more objectives at school 504 (Objectives 03, 06, 08) than at school 452. It is interesting, however, that the number of skills for which students reached a mastery level of 80% on the achievement monitoring tests was not significantly larger at test time 3 than at test time 1 at either school, although this apparent lack of growth may be inaccurate in describing school 452 where students mastered three skills at test time 2 and showed declines in achievement by test time 3. A pattern of steady achievement across test administrations was not characteristic at either school, being evidenced for only two skills (10, 11) at school 452 and two skills (06, 11) at school 504. In addition, in none of these four instances did students reach a level of 80% correct and in three of the cases the overall gains were not large.

Table 35

Achievement Scores for Three WDRSD Reading Skills: Achievement Monitoring Percentage Correct for the Total Group and Domain Referenced Percentage Correct, Mean, and Standard Deviation for the Total Group and for Six Target Students

(School 452, Grade 5)

		Test time 1				Test time 2				Test time 3			
Basic objectives[a]		Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students
Outlining (SS F11)		.52	.86	.59	.68	.40	.85	.47	.44	.49	.94	.71	.74
	Mean			5.3	6.2			4.2	4.0			6.4	6.7
	SD			2.4				2.2				1.9	
Indirect clues: Application (CC F2)		.69	.73	.40	.48	.90	.74	.41	.56	.87	.84	.43	.54
	Mean			3.2	3.8			3.3	4.5			3.4	4.3
	SD			2.1				2.3				1.9	
Conclusions: Indirect relationships (CC F5)		.77	.51	.30	.35	.73	.86	.58	.60	.67	.79	.53	.42
	Mean			2.4	2.8			4.7	4.8			4.2	3.3
	SD			2.5				2.2				2.6	

[a] Outlining was tested using three items on the achievement monitoring tests and nine on the domain referenced tests. Indirect Clues was tested using three and eight items, respectively, and three and eight items were used to test Conclusions: Indirect Relationships on the two types of tests.

Table 36

Achievement Scores for Three WDRSD Reading Skills: Achievement Monitoring Percentage Correct for the Total Group and Domain Referenced Percentage Correct, Mean, and Standard Deviation for the Total Group and for Six Target Students (School 504, Grade 5)

		Test time 1				Test time 2				Test time 3			
Basic objectives[a]		Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students	Achievement monitoring	Estimate of domain difficulty	Domain referenced total group	Domain referenced target students
Outlining (SS F11)		.63	.88	.66	.74	.49	.75	.45	.57	.55	.83	.64	.74
	Mean			6.0	6.7			4.0	5.2			5.8	6.7
	SD			2.4				2.6				2.9	
Indirect clues: Application (CC F2)		.53	.77	.40	.50	.70	.72	.42	.58	.78	.76	.37	.64
	Mean			3.2	4.0			3.3	4.7			3.0	5.2
	SD			2.0				2.4				2.0	
Conclusions: Indirect relationships (CC F5)		.70	.58	.34	.59	.59	.83	.54	.69	.84	.79	.48	.71
	Mean			2.7	4.7			4.3	5.5			3.8	5.7
	SD			2.5				2.3				2.3	

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[a] Outlining was tested using three items on the achievement monitoring tests and nine on the domain referenced tests. Indirect Clues was tested using three and eight items, respectively, and three and eight items were used to test Conclusions: Indirect Relationships on the two types of tests.

Finally, the achievement data suggest that the representativeness of the random sample of students for whom logs were maintained might be reconsidered at school 504, in that scores for the subgroup were considerably higher than those of the total group for all subtests at all administrations.

VII

INTERRELATIONSHIPS BETWEEN THE TIME AND ACHIEVEMENT VARIABLES

As outlined in Chapter I, the primary purpose of the WDRSD Descriptive Study was to describe the way in which the curriculum program was implemented and to relate the time variables to achievement on specific reading skills. Background information about the schools themselves as well as basic data concerning means of instruction, time, and achievement were reported in Chapters III through VI, and this chapter concerns the interrelationships among the variables in order to examine the effects of teachers' and students' use of time on actual performance.

The most direct type of relationship between instructional time and achievement is a linear one in which gain in achievement is thought of as directly related to the amount of time spent on specific aspects of the subject matter. While such a model only approximates the actual relationship and does not consider additional factors such as skill difficulty, prior achievement, and means of instruction, a simple linear model provides a point of departure for discussing the relationship between instructional time and achievement. We will consider this model of direct relationships first. Following this discussion, a more detailed analysis of the relationship as it is illustrated by specific Word Attack, Study Skills, and Comprehension objectives will be provided.

At each grade, nine of the 12 general objectives had time allocated on teacher logs and were represented on the achievement monitoring tests. At grade 2, objectives 8 and 9 were not included in the achievement monitoring tests, while for objective 12 no time was allocated. At grade 5, objectives 2, 5, and 12 were not included in the achievement monitoring tests. Pearson product-moment correlations were calculated between average gain on the achievement monitoring tests and number of minutes of allocated time for these nine objectives separately for periods A and B, a total of 18 cases at each school and grade level. Results are provided in Table 37 and plotted in Figure 8.

As indicated by these correlations, there does not appear to be a significant linear relationship between allocated time and achievement variables. Since complete data were not obtained for all cases on observed available, engaged, or estimated engaged time, no further correlations were calculated.

Several aspects of the data analysis should be considered in interpreting these correlations. First, to this point in the report and more generally in the analysis of the descriptive studies as a whole, data about instructional time have been presented in terms of 12 aggregates of skills, or general objectives. As explained in Chapter II, aggregations to these general objectives were made on the premise the instruction on a single skill might affect performance on related skills and that because of the transfer effect differences among skills within a general objective would not be sufficiently

Table 37

Correlation between Average Amount of Allocated Time Per Child and Achievement Gains for General Objectives

School	Grade	*r*
452	2	.13
504	2	-.002
452	5	-.03
504	5	.02

Horizontal axis: allocated time in minutes
Vertical axis: achievement gain or loss

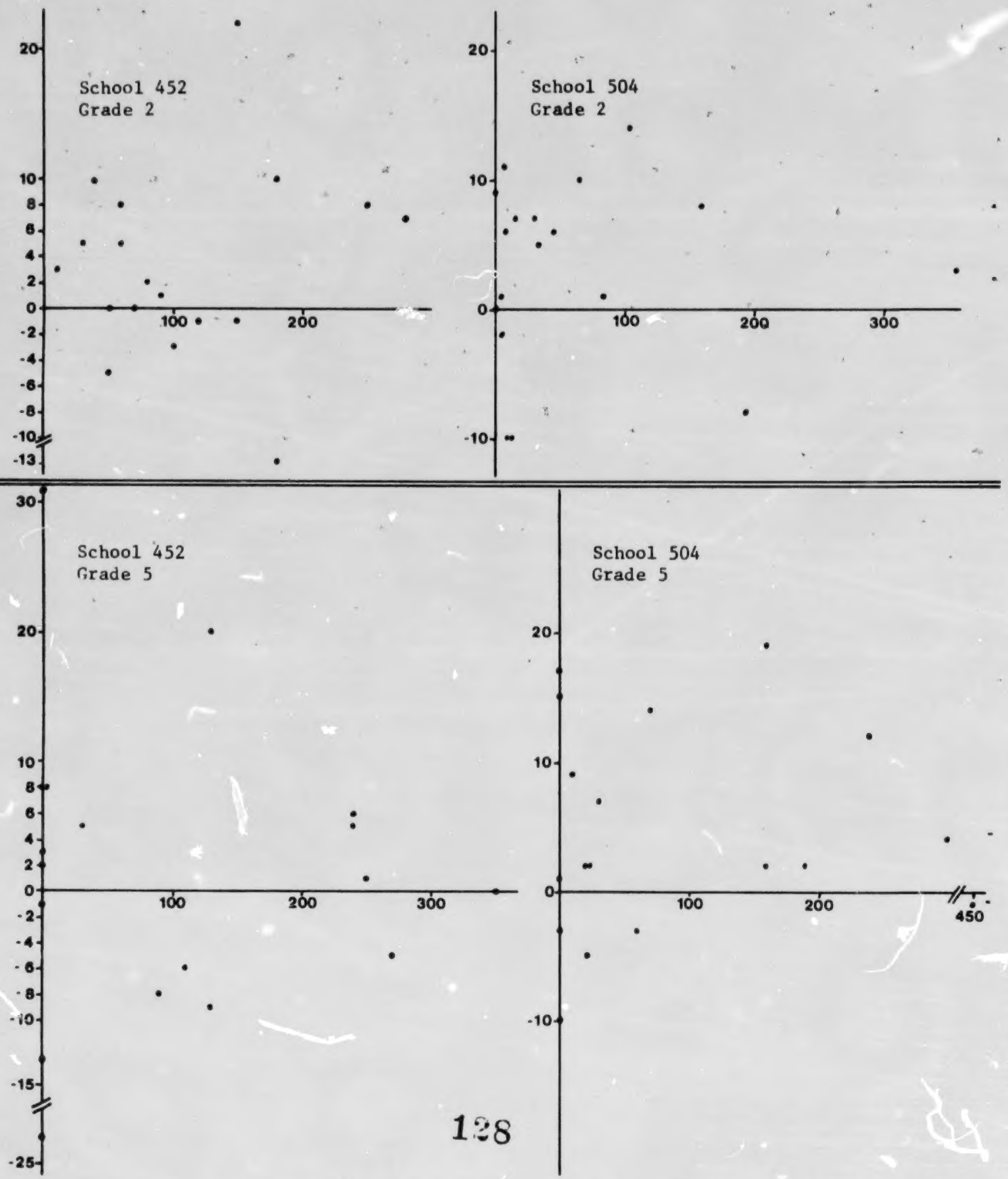

Figure 8. Scatterplots of average amount of allocated time per child and achievement gains for general objectives

large to have an impact on the relationships between time and achievement under consideration.

For the most part, this assumption does not appear to reflect the intentions of the curriculum developers. The writers of the WDRSD recognized the interrelationships between certain skills and considered that instruction in some skills may, for some students, affect performance on other related skills. Realistically, however, the developers warned against assuming mastery for a skill based on a student's performance on a closely related skill. For example, teachers were cautioned against assuming that if a student showed mastery for Word Attack B3--Beginning Consonant Sounds, he or she would also demonstrate mastery for Word Attack B4--Ending Consonant Sounds. In other words, some students, as a result of working with one skill, may develop the ability to use a closely related skill (e.g., a student who has been given instruction in beginning consonant sounds may recognize and identify ending consonant sounds without focused skill group instruction). The assumption cannot be made, however, that this would be true for all students. Separate skills were identified to ensure that teachers would provide instructional time for each skill which students had not mastered.

The implications of this position for the type of data aggregation used in this study are clear: Unless teachers allocated time to each skill within a general objective, there is no reason to expect a strong relationship between allocated time and achievement gains over the three test administrations. While it is still conceivable that a transfer effect may be useful in dealing with certain of the general objectives, the problem created by aggregation is very clear for at least two general objectives at grade 2 (04--Structural Analysis and 06--Passage Meaning skills) and three general objectives at grade 5 (06--Passage Meaning skills, 10--Map skills, and 12--Reference skills). In these five instances, from three to six strands containing between 10 and 23 individual skills were each aggregated under single general objectives.

One possible explanation for the apparent lack of relationships between instructional time and achievement focuses on the research methodology customarily used to aggregate data across a content area. This explanation suggests that when detailed skills among which there are few established links or points of transfer are under consideration, traditional forms of aggregation constitute a less effective basis for analysis.

A second aspect of the data analysis which might be considered in explaining the nonsignificant correlations between time and achievement variables deals with the manner in which children were grouped. Up to this point in the report, data have most frequently been presented for the entire group of students rather than for individual children. However, because research sites were selected on the basis of their characterization as IGE schools, it may be assumed that at least some emphasis was placed on instructional programming for the individual student.

Looking at Table 38, where an example of log allocated time for six randomly sampled target students is presented, it is evident that all students did not receive the same amount or type of instruction (for data for other grades and schools, see Nerenz, 1969a). In fact, about one-half of the students received instruction on specific Word Attack skills and one-third received instruction on Study skills or Comprehension objectives. In addition, the same amount of time on a particular skill was allocated to two students in only a small number of cases. Apparently instructional time was allocated to different children in different ways.

However, the figure used in calculating the relationship between instructional time and achievement represented the average number of minutes per child: That is, the total amount of allocated time per skill area was averaged using the number of children for whom logs were maintained rather than for the number of children who received instruction (one-half to one-third of the total number of children) or simply for the individual child under consideration. While such analysis representing the entire group may be effective when large group instruction is provided such that the instructional program varies only slightly for individuals within the group (see the DMP Descriptive Study Final Report, Webb, in press), this type of analysis is clearly less effective in describing instructional time in a more individualized program like the one described above. Thus, a second possible explanation for the nonsignificant relationships between the time and achievement variables focuses on the appropriateness of using traditional

Table 38

Allocated Time from Teacher Logs
By Topic and Objective for WDRSD
(School 452, Grade 2)

Activity		Percent of allocated time	Total time	Time in minutes for each student					
				13	15	16	18	23	38
				Word Attack					
203	WA B 5	.34	51	5	0	0	23	0	23
205	WA B13	1.33	199	0	125	0	37	0	37
206	WA C 1	.39	59	0	59	0	0	0	0
207	WA C 2	1.90	284	0	150	0	67	0	67
208	WA C 3	1.13	169	15	0	0	77	0	77
209	WA C 4	.83	125	8	21	50	48	0	48
210	WA C 5	.33	50	0	0	0	0	0	0
212	WA C 7	.13	20	0	0	0	10	0	10
213	WA C 8	.71	106	0	32	0	0	64	10
214	WA C 9	.98	147	50	33	0	0	64	0
215	WA C10	1.76	263	0	70	0	52	64	77
216	WA C11	.12	18	0	12	0	0	6	0
217	WA C12	1.50	224	0	0	0	112	0	112
218	WA C13	1.21	181	67	114	0	0	0	0
219	WA C14	3.17	475	225	0	0	0	250	0
220	WA C15	4.88	731	175	264	0	21	250	21
221	WA C16	5.20	779	240	8	270	15	231	15
223	WA C18	3.97	595	0	235	0	0	360	0
224	WA D 2	2.04	305	5	0	300	0	0	0
225	WA D 3	2.67	400	0	0	145	245	0	10
226	WA D 4	.81	122	15	52	25	15	0	15
227	WA D 7	2.80	420	0	0	150	270	0	0
311	WA D 6	.17	26	0	0	0	13	0	13
316	WA B10	2.04	306	132	68	0	53	0	53
320	WA D 5	5.04	755	0	0	0	225	0	530
321	WA D 6	2.12	318	0	18	0	50	0	250
339	WA B 9	1.08	162	92	8	0	31	0	31
346	WA B11	.67	100	50	0	0	0	50	0
				Study Skills					
228	SS C 1	3.24	485	350	135	0	0	0	0
230	SS C 3	2.40	360	0	0	150	0	0	210
231	SS C 4	1.44	215	0	0	0	215	0	0
233	SS C 6	2.14	320	70	70	70	15	0	95
234	SS C 7	2.39	358	155	203	0	0	0	0
238	SS C11	4.79	718	20	29	0	297	80	292

Table 38 (continued)

Activity	Percent of allocated time	Total time	Time in minutes for each student 13	15	16	18	23	38
			Study Skills (continued)					
312 SS D10	.67	100	0	0	0	50	0	50
322 SS E12	.17	25	0	0	0	0	0	25
323 SS D 8	.15	23	0	23	0	0	0	0
333 SS B 3	.73	110	0	0	55	0	55	0
335 SS E 9	.17	25	0	0	0	0	0	25
338 SS B 1	1.40	210	0	0	0	0	210	0
345 SS D11	.04	6	0	6	0	0	0	0
			Comprehension					
302 CC D 3	1.37	205	0	0	0	205	0	0
303 CC C 4	1.37	205	95	0	110	0	0	0
305 CC D 6	1.64	245	0	0	0	95	0	150
310 CC C 2	4.33	648	210	161	155	61	0	61
324 CC C 1	1.10	165	0	17	0	74	0	74
327 CC C 3	1.34	200	0	0	200	0	0	0
330 CC B 1	2.25	337	0	133	0	0	204	0
331 CC D 4	1.50	224	0	0	0	0	0	224
332 CC B 2	.26	39	0	39	0	0	0	0
334 CC B 4	.97	145	0	0	0	0	145	0
336 CC B 3	1.77	265	0	0	0	0	265	0
337 CC E 6	.13	20	0	0	0	10	0	10
340 CC C 5	1.27	190	0	190	0	0	0	0
341 CC D 5	.77	115	0	0	0	115	0	0
342 CC E 4	1.34	200	0	0	0	0	0	200
			Other					
245 IR	.36	54	0	0	0	27	0	27
246 SDR	.41	62	0	0	0	31	0	31
301	.72	108	8	72	0	14	0	14
306	.13	20	0	0	0	10	0	10
307	6.68	1,000	0	0	250	375	0	375
313	.05	8	0	8	0	0	0	0
319	.50	75	0	0	0	25	0	50
343	.59	88	88	0	0	0	0	0
344	.10	15	15	0	0	0	0	0
			Totals					
	100.00	14,978	2,090	2,355	1,930	2,983	2,298	3,322
# of no activity days		47	8	8	8	8	8	7
# of days absent		30	7	3	10	6	2	2

methods for describing groups of students when instruction is programmed not for groups but rather for individual children.

In that these approaches to data concerning time and achievement do not appear to be appropriate when more individualized instruction is being considered, time data were scaled and then correlated with achievement as outlined below.

First, the time allocations were adjusted to reflect the average number of minutes allocated to the children who received instruction rather than the average number of minutes per child: The number of logged minutes was multiplied by the proportion of children receiving time (1 of 6 = .17, 2 of 6 = .33, 3 of 6 = .50, and so forth) and this product was then multiplied by the number of children in the class or unit. For example, if 200 minutes were logged on Word Attack B3 for three of the six children for whom logs were maintained and there were 30 children in the class, then the following calculation was used: 200 minutes x 3/6 x 30 = 3,000 minutes. Thus, the adjusted time allocation was made to reflect not only the absolute number of minutes but also the percentage of the unit to which those minutes were allocated.

These adjusted time allocations were then correlated with gain scores for the individual reading skills which were tested rather than with aggregated groups of skills. Because time was not logged to every skill at every school, the number of cases entering into the calculation differs by grade and by school. The number of cases used in each correlation, a correlation using periods A and B as separate cases, and a correlation between total gain and allocated time for the entire investigative period are reported in Table 39. Scatterplots are shown for the total time period in Figure 9.

As shown, correlations are considerably larger than those reported in Table 37 and are generally slightly higher for the total period than for the greater number of cases included for periods A and B. However, in neither case do the correlations suggest that there is a strong linear relationship between allocated time and achievement gain.

While this may be due to the quality of the relationship between the variables or to the procedures used during data collection and analysis, at least one aspect of the data should be considered in interpreting the nonsignificant findings.

As noted in the Teacher's Planning Guide: Word Attack for word attack skill instruction (Otto & Askov, 1972):

> To implement the Word Attack element effectively, at least two hours per week should be allotted to skill group instruction . . . . Since . . . most skills require approximately three to ten hours of instruction, skill groups may have to extend beyond two to three weeks if children are simultaneously given instruction in several skills (p. 15).

Thus, for Word Attack in the primary grades, at least 240 to 360 minutes should be scheduled per child/per skill. Similar statements were made regarding the amount of time which the developers suggest be devoted to instruction in the Study Skills and Comprehension elements (Chester, Askov, & Otto, 1973; Otto & Kamm, 1977): To provide a minimum of comprehension and study skills instruction, it is recommended that at least 40 minutes per week totaling 120 minutes per skill be allocated to each of the two elements at the primary level and at least 150 to 180 minutes per week be allocated to each element at the upper elementary level.

Table 39

Correlation between Average Amount of Allocated Time Per Child and Achievement Gains for Individual Reading Skills

		Periods A and B		Total period	
School	Grade	Number of cases	r	Number of cases	r
452	2	42	.16	21	.24
504	2	38	.24	19	.21
452	5	22	-.20	11	-.24
504	5	32	.02	16	.13

Horizontal axis: allocated time in thousands of minutes
Vertical axis: achievement gain or loss

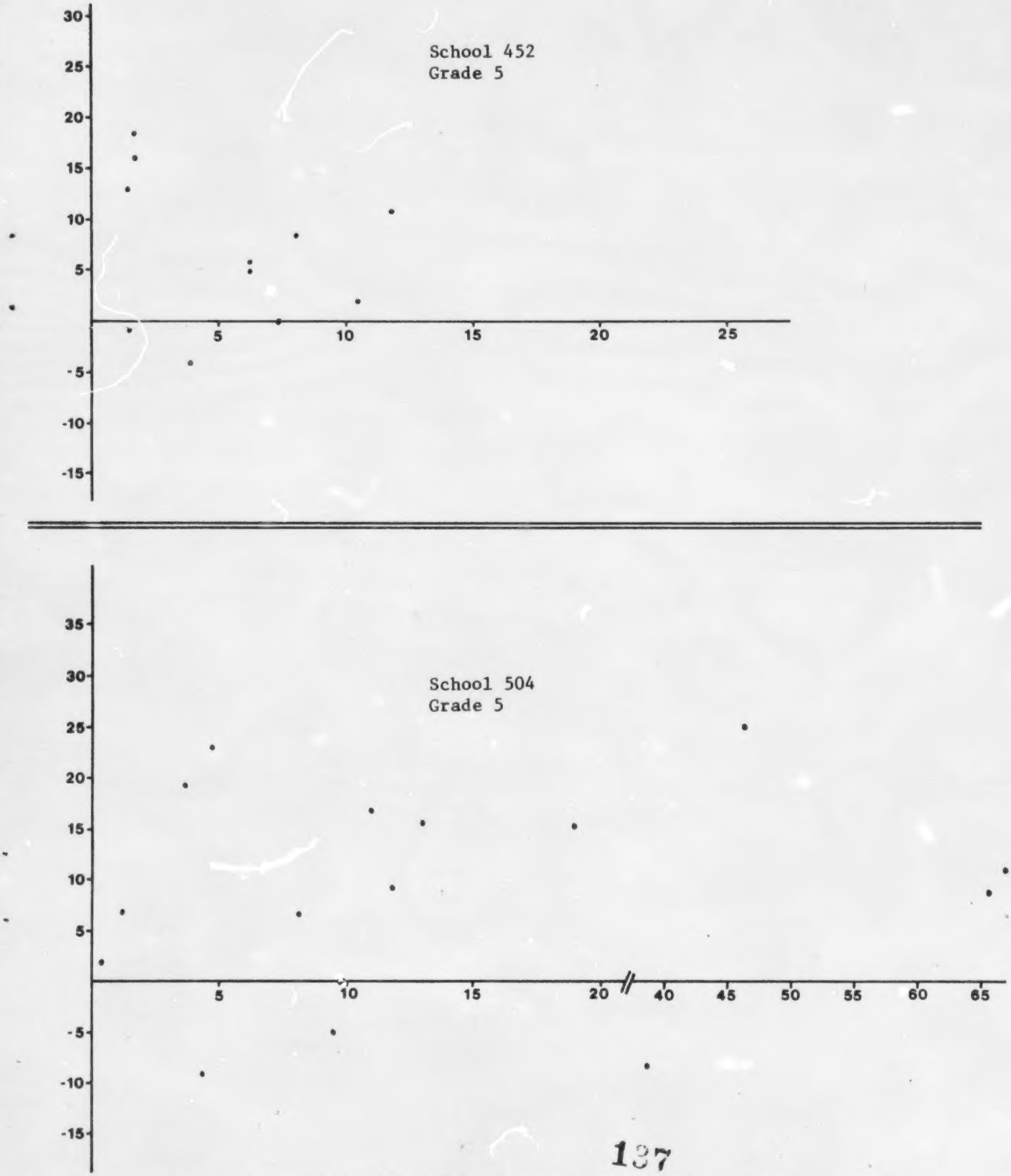

Figure 9. Scatterplots of average amount of allocated time per child and achievement gains for individual reading skills.

Horizontal axis: allocated time in thousands of minutes
Vertical axis: achievement gain or loss

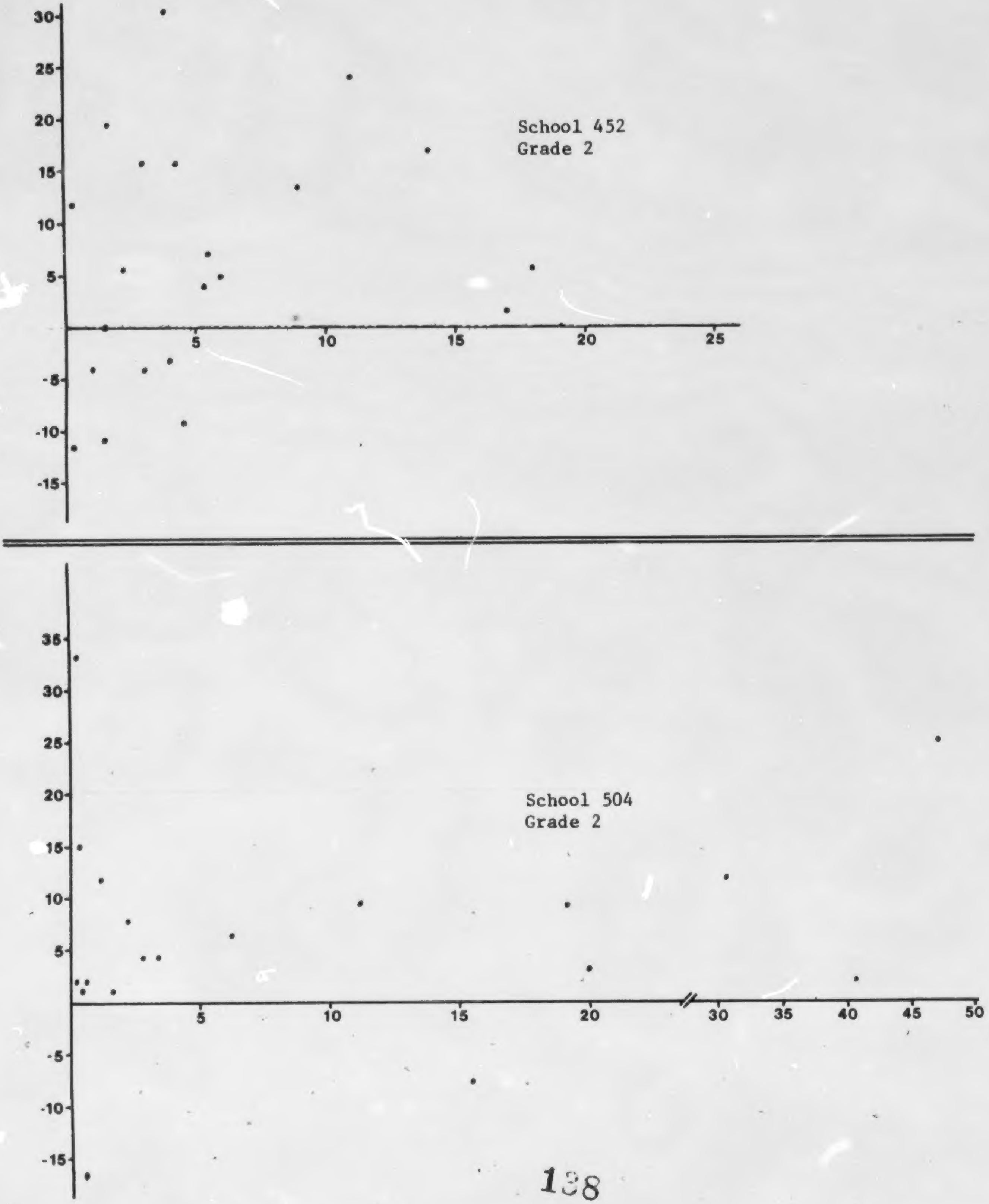

Figure 9 (continued)

By summing the total number of minutes allocated to each of the three WDRSD elements (Word Attack, Study Skills, Comprehension) using data in Tables 16, 17, 21, and 22, an estimate of the average number of minutes allocated to each element per week was obtained. This figure is compared in Table 40 with the developers' recommended time allocations discussed above.

Table 40 shows that the minimum number of minutes which the WDRSD developers recommended generally exceeds the average number of minutes which were actually allocated at grade 2 for both schools across the three elements. The number of minutes allocated to instruction was larger than the minimum recommended time only for the Comprehension element at school 452. In four of the five other cases, about 60% of the recommended amount of time was logged as being spent in instruction, although the difference between recommended and allocated time is not very meaningful for Study Skills or Comprehension at school 504 since those elements were not implemented.

A similar situation appears at grade 5, where the average number of allocated minutes exceeds the recommended level only for Comprehension at school 504. This, however, may be due to the fact that the entire reading period was logged and thus a large amount of general reading was coded under the Comprehension element. In addition, since Word Attack and Study Skills were not really implemented in the upper elementary unit, the comparisons for school 504 are less useful. However, at school 452 where all three elements were used, less than one-half of the suggested minimum time allocations for Study Skills and

Table 40

Number of Minutes Allocated and Recommended Per Week Per Child for Three WDRSD Elements by Grade for Schools 452 and 504

	School 452 Grade 2			School 504 Grade 2			School 452 Grade 5			School 504 Grade 5		
	WA	SS	C	WA	SS	C	WA	SS	C	WA	SS	C
Total logged minutes	1,090	340	850	1,054	62	458	60	1,000	1,010	110	770	3,570
Average number of minutes allocated per week	78	24	61	75	4	33	4	71	72	8	55	255
Minimum recommended number of minutes to be allocated each week	120	40	40	120	40	40	30	150	180	30	150	180

Comprehension were actually logged, with the small amount of time allocated to Word Attack probably due to the fact that most students had already mastered those skills.

Overall, then, relatively large differences exist between the amount of time which was allocated and the amount of time the developers considered necessary for continuous skill development and mastery. In that less than the minimum amount of time was allocated especially to Word Attack at grade 2 and to Study Skills and Comprehension at grade 5, it is not surprising that there are very few large gains in achievement over the investigation period. Thus, a final explanation of the non-significant correlations between time and achievement suggests very simply that an insufficient amount of time was allocated to instruction, resulting in small and relatively unstable changes in students' performance.

References

Chester, R. D., Askov, E., & Otto, W. *Teacher's planning guide: Study skills*. Minneapolis, Minn.: National Computer Systems, Inc., 1973.

Dunham, T., Nerenz, A. G., & Webb, N. L. *Reading achievement measures developed for the descriptive study of phase IV of the IGE evaluation project* (Project Paper 79-29). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979.

Harnischfeger, A., & Wiley, D. E. *Teaching-learning processes in elementary schools: A synoptic view* (Report No. 9). Chicago: University of Chicago, Studies of Educative Processes, 1975.

Harris, C. W., & Pearlman, A. P. An index for a domain of completion on short answer items. *Journal of Educational Statistics*, 1978, *3*, 285-303.

Klausmeier, H., Rossmiller, R., & Saily, M. (Eds.). *Individually guided education: Concepts and practices*. New York: Academic Press, 1977.

Marliave, R., Fisher, C., Filby, N., & Dishaw, M. *The development of instrumentation for a field study of teaching* (Beginning Teacher Evaluation Study, Technical Report I-5). San Francisco: Far West Laboratory for Educational Research and Development, 1977.

McDonald, F. J., & Elias, P. A report on the results of phase II of the beginning teacher evaluation study. *Journal of Teacher Education*, 1976, *17*, 315-332.

Nerenz, A. G. Log data for the two WDFSD schools descriptive study grades 2 and 5 (Project Paper 79-21). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (a)

Nerenz, A. G. Reading skills achievement monitoring tests: Descriptive study test time I (Project Paper 79-2). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (b)

Nerenz, A. G. Reading skills achievement monitoring test: Descriptive study test time II (Project Paper 79-5). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (c)

Nerenz, A. G. Reading skills achievement monitoring test: Descriptive study test time III (Project Paper 79-8). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (d)

Nerenz, A. G. Reading skills domain referenced test: Descriptive study test time 1 (Project Paper 79-10). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (e)

Nerenz, A. G. Reading skills domain referenced test: Descriptive study test time 2 (Project Paper 79-12). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (f)

Nerenz, A. G. *Reading skills domain referenced test: Descriptive study test time 3* (Project Paper 79-14). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (g)

Nerenz, A. G. *WDRSD and DMP teacher interviews for the descriptive study of phase IV of the IGE evaluation project* (Project Paper 79-30). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (h)

Nerenz, A. G. *WDRSD observation data for the descriptive study of phase IV of the IGE evaluation project: Grade 2* (Project Paper 79-16). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (i)

Nerenz, A. G. *WDRSD observation data for the descriptive study of phase IV of the IGE evaluation project: Grade 5* (Project Paper 79-19). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (j)

Nerenz, A. G., & Webb, N. L. *Aggregation and scaling of variables for the descriptive study of phase IV IGE evaluation project* (Project Paper 80-1). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1980.

Otto, W. The Wisconsin Design: A reading program. In H. J. Klausmeier, R. A. Rossmiller, and M. Saily (Eds.), *Individually guided education: Concepts and practices*. New York: Academic Press, 1977.

Otto, W., & Askov, E. Teacher's planning guide: Word attack. Minneapolis, Minn.: National Computer Systems, 1972.

Otto, W., & Askov, E. Rationale and guidelines. Minneapolis, Minn.: National Computer Systems, 1973.

Otto, W., & Kamm, K. Teacher's planning guide: Comprehension. Minneapolis, Minn.: Educational Systems, 1977.

Romberg, T. A. IGE evaluation: Perspectives and a plan (Working Paper No. 183). Madison: Wisconsin Research and Development Center for Cognitive Learning, 1976.

Romberg, T. A. DMP: The elementary mathematics program for Individually Guided Education. In H. J. Klausmeier, R. A. Rossmiller, and M. Saily (Eds.), Individually guided elementary education: Concepts and practices. New York: Academic Press, 1977.

Rosenshine, B. V. New insights and questions from recent research in elementary schools. Paper presented at the meeting of the American Educational Research Association, New York, April 1977.

Venezky, R. L., & Pittelman, S. D. PRS: A prereading skills program for Individually Guided Education. In H. J. Klausmeier, R. A. Rossmiller, and M. Saily (Eds.), Individually guided elementary education: Concepts and practices. New York: Academic Press, 1977.

Webb, N. L. Observation procedures for the descriptive study of the evaluation project (Project Paper 79-32). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (a)

Webb, N. L. *Teacher logs for the descriptive study of phase IV of the IGE evaluation project* (Project Paper 79-31). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979. (b)

Webb, N. L., & Romberg, T. A. *The design for the study of reading skills and mathematics curriculum products IGE evaluation project--phase IV* (Project Paper 79-42). Madison: Wisconsin Research and Development Center for Individualized Schooling, 1979.

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